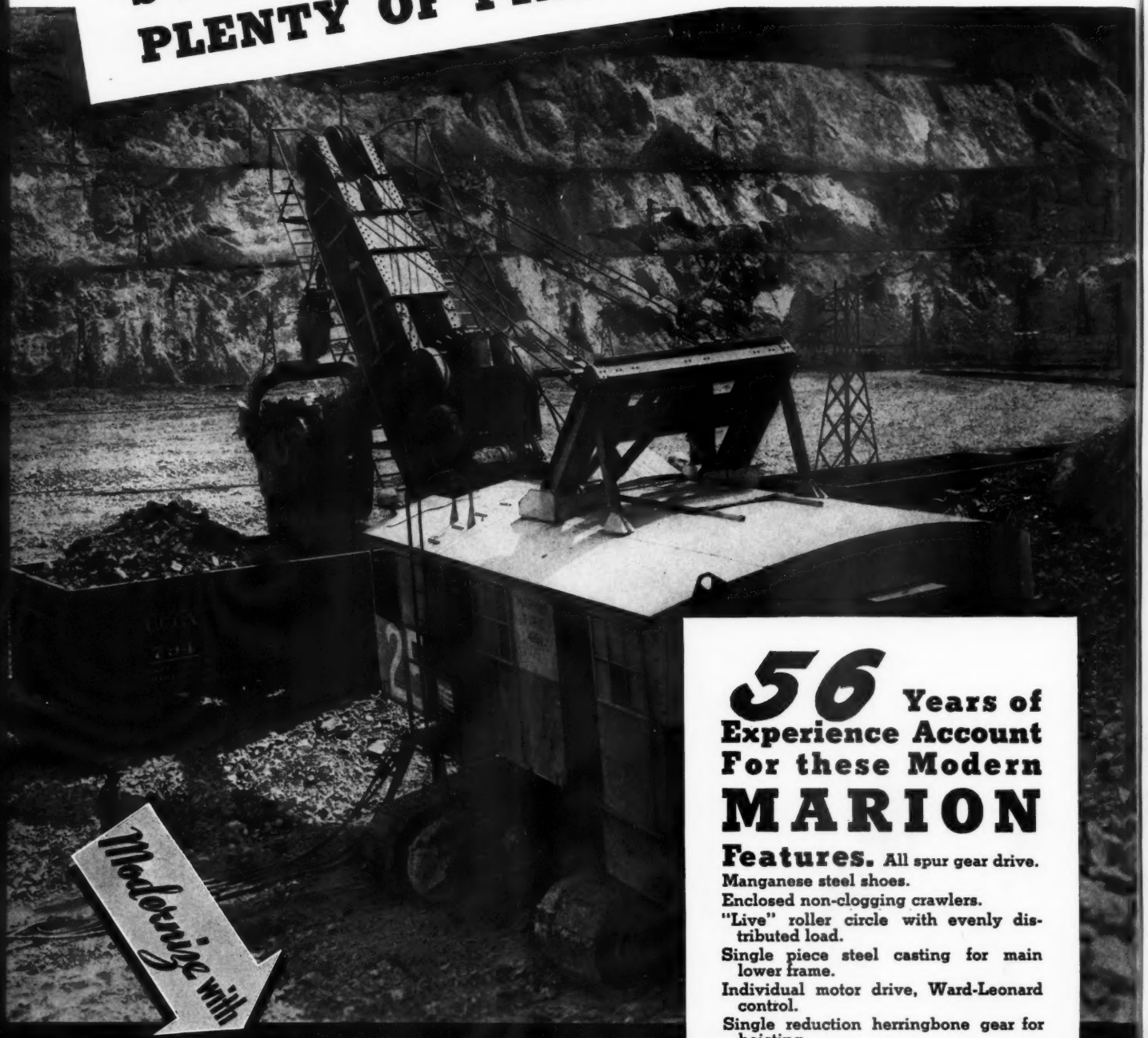
MINING CONGRESS JOURNAL

JANUARY
1941

FFICIAL

UBLICATION

AN "OLD HAND" AT STRIP MINING • • WITH PLENTY OF PRACTICAL IDEAS



56 Years of Experience Account For these Modern MARION

Features. All spur gear drive.

Manganese steel shoes.

Enclosed non-clogging crawlers.

"Live" roller circle with evenly distributed load.

Single piece steel casting for main lower frame.

Individual motor drive, Ward-Leonard control.

Single reduction herringbone gear for hoisting.

Complete control including steering, at operator's station.

Triple hitch to dipper for hoisting cable.

Boom length proportioned for maximum digging effort.

Easily and quickly convertible to dragline service.

Write for catalog describing these MARION STRIPPING SHOVEL features in detail.

The Marion Steam Shovel Co.
Marion, Ohio, U. S. A.

MARION

SHOVELS • DRAGLINES • CLAMSHELLS
CRANES • PULL-SHOVELS • WALKERS
From ¾ Cubic Yard to 35 Cubic Yards • Gasoline - Diesel - Electric

Editorial Director
JULIAN D. CONOVER

Editor
RUSSELL C. FLEMING

Associate Editors
A. W. Dickinson — P. D. McMurrer
G. B. Southward — H. L. Moffett
B. E. Chambers

Field Representatives
Frank W. Moran
James E. Neary, Jr.

MINING CONGRESS JOURNAL

Vol. 27 JANUARY, 1941 No. 1

HERE WE ARE, off to a flying start for 1941, a year which promises to be a busy and significant one for the mining industry. The Journal will be in the thick of it as usual, observing, reporting and recording developments for you.

NEXT MONTH in our big Annual Review number we pause briefly to sum up the furlongs just run in 1940. The year was definitely one of progress—a time of increasing power and momentum, a general tightening up of loose connections for the difficult future. All this will pass under review. Improvements and changes in technology and safety, economics and production will be presented from the pens of authorities in each branch of the industry.

YOU MUST NOT MISS IT!

TABLE OF CONTENTS

Page

FRONT COVER: Aerial View of Surface Plant, Mine No. 24, of Peabody Coal Company, Westville, Ill. Photograph Aerial Survey Co.

EDITORIALS:
Defense Production Calls for Teamwork 9
Stop the Explosions 9

PROGRESS OF SLUSHING AND GROUND SUPPORT AT CLIMAX 10
By F. S. McNicholas

THE ROYALTON "SOLID FUEL REFINERY" OF FRANKLIN COUNTY COAL CORPORATION 16
By Harlan E. Oehler

PROGRESS IN MILLING PRACTICE AND EQUIPMENT 21
By Bancroft Gore
Discussion by T. G. Chapman 27

SOME EFFECTS OF MECHANIZATION UPON CONSERVATION OF COAL DEPOSITS 28
By Albert L. Toenges

WHY DID THEY DIE? 30

CARLTON DRAINAGE TUNNEL 32
By A. H. Bebee

PUBLIC MINERAL LAND WITHDRAWALS 35
By Richard L. Neuberger
Discussion by H. L. Faulkner and Victor J. Hayek 39

MINING GEOLOGY TODAY AND TOMORROW 42
By Reno H. Sales

THE EXCESS PROFITS TAX AND WESTERN MINING 45
By Leo J. Hoban

THE MARCH OF COAL MINING—Ten Years of Progress
A Forecast of Future Trends 49
By G. B. Southward

WITH THE COAL DIVISION OF THE AMERICAN MINING CONGRESS
Monthly Cost Statements for Mobile Loading Machines 51

WHEELS OF GOVERNMENT 54

PERSONALS 56

NEWS AND VIEWS 58

MANUFACTURERS' FORUM 64

Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

Published monthly. Yearly subscription, United States and Canada, $2.00. Foreign, $4.00. Single copies, $0.20. Entered as Second-Class Mail Matter, January 30, 1915, at the Post Office at Washington, D. C.

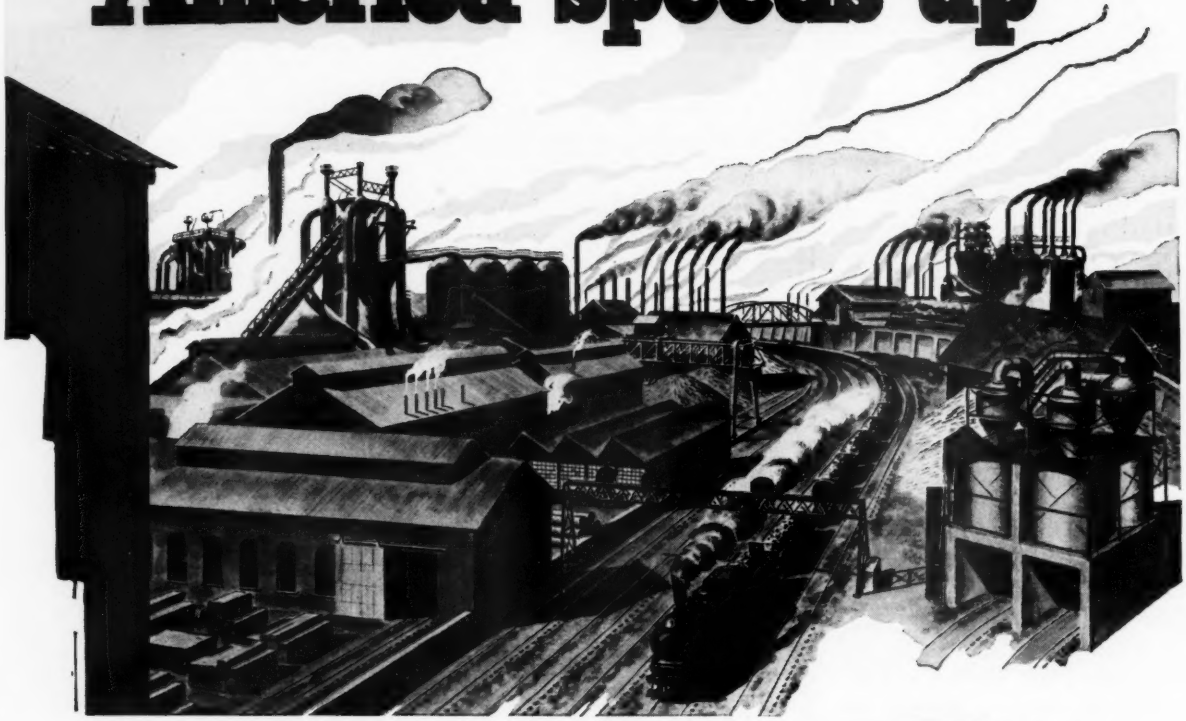
Member, Audit Bureau of Circulations

Copyright 1941 by

THE AMERICAN MINING CONGRESS
309 Munsey Bldg., Washington, D. C.

Howard I. Young, President — Edward B. Greene, Vice President
David D. Moffat, Vice President — Donald A. Callahan, Vice President
Julian D. Conover, Secretary

America speeds up



. . . with batteries that can "take it" in underground haulage

Faster haulage speeds, and heavier loads of industry's basic materials produced by mine and quarry—both are needed underground today to meet the quickened tempo of manufacture and production. When locomotives or trammers are powered with Exide-Ironclads, you can call on them for more power and higher haulage speed with the certainty that these batteries will not fail you.

The outstanding quality of Exide-Ironclads is their dependability under the toughest conditions. Combined with high power ability and sustained voltage, Exide-Ironclad dependability enables you to haul more coal, ore, rock, or muck without paying a premium in short battery life or high battery maintenance.

Exide-Ironclads not only can deliver the increased performance you need, but they can stand up and "take it" when underground haulage speeds up. Write for free booklet, "The Storage Battery Locomotive for Underground Haulage."

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto

Exide
IRONCLAD
BATTERIES

These 3 and 150 more

G-E 25-hp, d-c motor driving mother belt conveyor

G-E 5-hp, d-c motor driving chain room conveyor

G-E 10-hp, d-c motor driving chain conveyor

Installation of G-E direct-current motors on an extensive scale is an important part of the big mechanization program of Rochester and Pittsburgh Coal Company. All major properties are involved. These motors are meeting crucial performance tests in diverse applications. Their dependable operation contributes to low-cost production.

HERE'S why you can depend on General Electric d-c motors to meet the severe requirements of underground mining:

1. They're available in dripproof and enclosed construction, and in designs declared suitable by the Bureau of Mines for operation in mine gas atmospheres.
2. All types are designed to make the brushes easily accessible.
3. Formex magnet wire is used in the main field coils, because its insulation is remarkably tough, flexible, and abrasion-resisting, and retains its characteristics despite long exposure to heat.
4. Armature coils are pretreated and form wound (frames 254 and above) with mica tubes around the slot portion. The coil insulation is heat- and moisture-resisting, tough and flexible.
5. The armature shafts are readily removable (frames 254 and above).
6. The commutators are built up of copper and mica segments.
7. The bearings are rigidly supported to assure long life.

Our nearest representative will be glad to help with your requirements. General Electric Co., Schenectady, N. Y.

GENERAL ELECTRIC

1,000 TIMKEN BEARING EQUIPPED MINE CARS ARE USED AT THIS ANTHRACITE MINE

A rising tide of modernization is spreading through the anthracite fields. Timken Bearing Equipped mine cars boost production; cut car hauling and maintenance costs; save on lubrication.

Miners find them easier to handle. Locomotive operators haul longer loaded trains. Empties are returned faster.

Shown below is mine of No. 9 Coal Company, Pittston, Pa., operated by Louis Pagnotti. 1,000 TIMKEN Bearing mine cars have been in use here for nearly 2 years. 500 more are now on order. Large numbers of TIMKEN Tapered Roller Bearings also used in breaker equipment, including belt conveyors, crushers, screens.

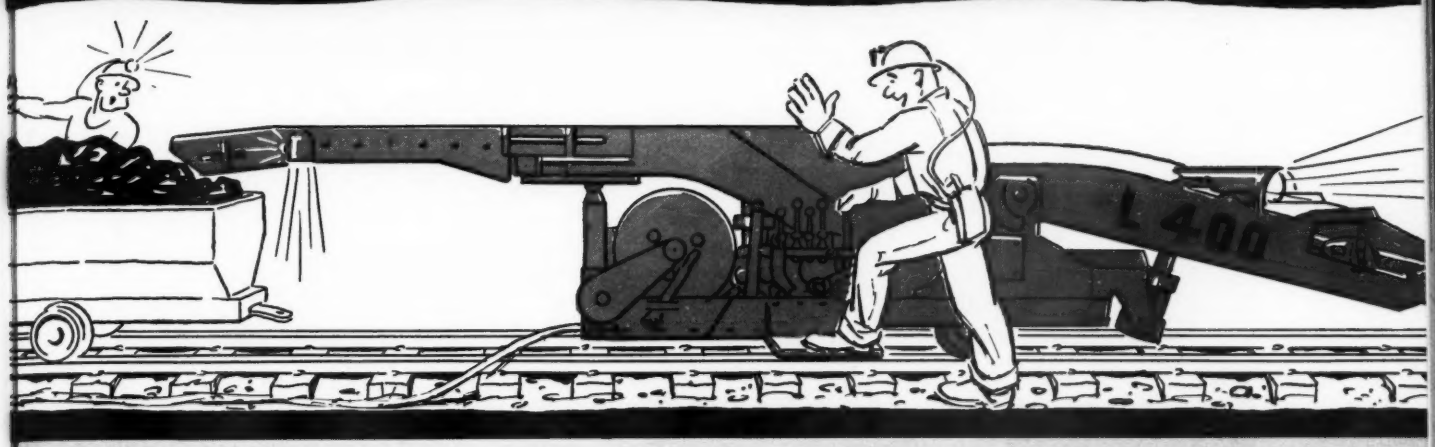
Stop losing money with antiquated mine cars. Get in step with the modern trend to "Timken Bearing Equipped."

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN
TAPERED ROLLER BEARINGS

Manufacturers of TIMKEN Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; TIMKEN Alloy Steels and Carbon and Alloy Seamless Tubing; and TIMKEN Rock Bits.

THE Big 3

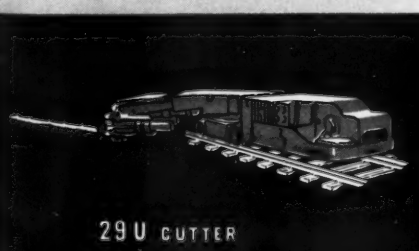


LUKE the LOADER:

Drag out that car you so and so –
She's a hog for coal and rarin' to go.

HAP the HELPER:

Get up your boom and ride that rail –
The cuttin' machine is on our tail.



**WHEN UNITS ARE BALANCED IN CAPACITY
THE PRODUCTION FLOW IS KEPT UNIFORM**

THE JEFFREY MFG. CO.
COLUMBUS, OHIO

New Editor Appointed

MINING CONGRESS JOURNAL takes pleasure in announcing the appointment, effective January 1, 1941, of Russell C. Fleming as editor. He succeeds Richard J. Lund, who recently resigned to devote his full time to the Raw Materials Division of the National Defense Advisory Commission.

Mr. Fleming is a mining engineer who has had wide and varied experience in both coal and metal mining. He recently returned from the Philippine Islands, where he organized the Safety Division and mine inspection service of the Philippine Bureau of Mines and had charge of the exploration and development of the coal resources of the islands, including development of two properties into active production.

A graduate of the University of Illinois, his early mining experience was as laborer and miner in various coal mines in Illinois and West Virginia, and from 1925-1928, as engineer with the Maryland Bureau of Mines. He then resided in the West for nine years, serving briefly as engineer on geophysical prospecting for the Radiore Company of Los Angeles, and with the Miami Copper Company. For three years he was field representative of Mining and Metallurgy, contributing numerous articles on operating problems and new developments, and maintaining contact throughout the country with local sections of the American Institute of Mining and Metallurgical Engineers. Later he served as examining engineer for the Southwestern Engineering Company and subsequently as field engineer for Timken Roller Bearing Company, making test runs of detachable bits in metal mines of the southwestern United States.

Mr. Fleming is the author of numerous articles in the trade and technical press and of a textbook, "Electricity as Applied to Coal Mining," prepared for use in the miners' vocational schools of Maryland and other states. For publication by the Seeley Mudd Fund of the A. I. M. E. in 1932 he revised C. Godfrey Gunther's "Examination of Prospects."

Mr. Fleming's broad knowledge of the mining industry in its various branches, his wide acquaintance and his editorial experience and ability make him particularly fitted to serve as editor of Mining Congress Journal.

A JOURNAL FOR THE ENTIRE MINING INDUSTRY—PUBLISHED BY THE AMERICAN MINING CONGRESS

MINING CONGRESS JOURNAL

Vol. 27 JANUARY, 1941 No. 1

DEFENSE PRODUCTION CALLS FOR TEAMWORK

IN THE present national and international emergencies the recently much-touted "doctrine of scarcity" has been swept aside. On our ability to produce in abundance may hinge our fate as a free and democratic nation, and only the utmost degree of teamwork on the part of our government, the investing public, industrial management and workmen can attain the end for which we all must strive.

One case in point is the Wagner Act. By now our experiences of the past six years under this Act as administered by the National Labor Relations Board have taught lessons of value in guiding our future course. One of the most idealistic members of the Senate has repeatedly expressed the view that the United States needs a "code of labor law"; and has frequently stated that in this regard we are forty years behind the nations of Europe. The last 16 months in Europe, however, have not demonstrated any striking superiority of industrial relations in those countries which might serve as models to American managements and labor—the facts show quite the reverse.

The special Committee of the House of Representatives which for the past 17 months has been investigating the National Labor Relations Board and its administration of the Wagner Act has just made a valuable report, accompanied by the recommendation that the Howard W. Smith amendments to the Act, which were passed by the House and blocked by the Senate Committee on Education and Labor in the last session, be made law at an early date. First and foremost, these amendments would separate the judicial and administrative functions of the Board, restore employers' freedom of speech and permit employers to request election. The fairness of the Smith Investigating Committee toward the troubled NLRB situation is evident in its constructive comment concerning Dr. William M. Leiserson, whom the Committee commends for his "spirited single-handed fight" for "the elimination of partiality, incompetence and inefficiency." The Committee's position gains further credit from the President's refusal to retain two of the original members on the Labor Board upon the expiration of their appointed terms of service. The recently appointed Chairman of the Board, Dr. Harry A. Millis of Chicago, commands, as does his associate, Dr. Leiserson, the respect of a large section of industrial managements in the United States. These two men are well-experienced and practical workers in the field of industrial relations and they have an immediate and excellent opportunity to win the confidence of industrial managements and workmen.

The constructive amendments to the Act drawn by the Smith Committee are the result of long experience and their immediate enactment by the Congress will help materially toward industrial peace in this time of need.

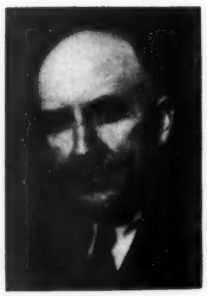
STOP THE EXPLOSIONS

THE reintroduction of the Federal Coal Mine Inspection bill in the present session of Congress again brings to mind the naive statements that if this proposed legislation is enacted into law there will be no more coal mine catastrophes. Such a stand on the part of any responsible Federal official would inevitably, in the event the Mine Inspection bill became law, sooner or later cause him embarrassment, particularly in case such official were charged with the administration of that law.

What the present situation really demands is the resumption and continuation on a sufficient scale of the excellent catastrophe prevention and inspection service so ably furnished by the Bureau of Mines in the years 1915 to 1930 before the allocation of the Bureau's funds seriously curtailed the work of its Safety Division. The Secretary of Interior has within his power the capacity to earn the lasting gratitude of mine managements, workmen and their families if he will but make it possible for the highly regarded Safety Division to carry on with a campaign to educate and assist the present generation of coal miners and employers throughout the nation in guarding against the potential dangers of coal mine gas and dust ignitions. Coal mining men of today must have this training immediately. The Bureau of Mines Safety Division is the agency to do it and no Federal police powers are needed. Service of the Bureau's experienced staff will be welcomed in every mining property.

Progress of SLUSHING and GROUND SUPPORT at CLIMAX†

● ***Trend Toward Smaller Equipment and Smaller Openings, with Concrete Slusher Drifts and Grizzly Chambers for Weak Ground Operations***



By F. S. McNICHOLAS
Assistant General Superintendent
Climax Molybdenum Company

SLUSHING and ground support practice have undergone a number of changes as the experience of the past years is capitalized upon at the Climax Molybdenum Company operations at Climax, Colo. Increased safety and efficiency have occasioned certain modifications of operations which were described in a paper "Slushing vs. Gravity Loading at Climax," presented by W. E. Romig, general superintendent of the company, at the 1937 Metal Mining Convention and Exposition (MINING CONGRESS JOURNAL—November, 1937).

An explanation of the factors underlying changes made in slushing operations and ground support during the past three years would seem to be in order.

Slushing Practice Improved

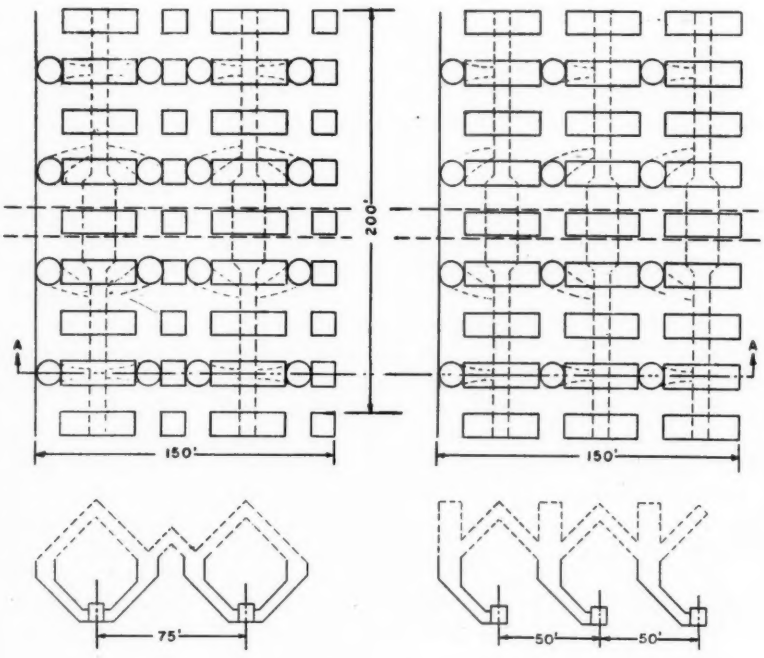
The trend in slushing operations at Climax has been toward smaller equipment and smaller openings. A comparison of the previous standards and the present is given below.

Spacing of Slusher Drifts:

The spacing of slusher drifts on the Phillipson Level has been changed from 75-ft. centers with fingers on both sides of the drift to 50-ft. centers with fingers on one side only. Spacing of fingers remains at 50 feet. (See Figure 1.) The reason for the change is to leave stronger pillars over the slusher drift, to secure a section that can be more easily supported and to increase the safety of the operation. The cost of development with slusher drifts concreted is somewhat greater for the new method, averaging 7.13 cents per ton for the former method and 8.95 cents per ton for the new method, exclusive of main haulage drifts. This average is for a tonnage of about 46 million tons that will be developed by this method above the Phillipson Level.

Size of Slusher Drifts:

In the footwall where ground is hard, drifts are now driven about 7 x 9 feet to accommodate a 72-in. scraper. Where ground is firm, but not hard enough to maintain a 7 x 9-ft. drift and concrete is deemed unnecessary, drifts are driven about 6 x 7½ feet to accommodate a 60-in. scraper. Where ground is weak and concrete is thought necessary, drifts are driven 9 x 11 feet and are concreted to give a



SECTION 'A A'

Fig. 1. Comparison of slusher undercutting on 50 and 75 ft. centers

†Presented Annual Metal Mining Convention, Western Division, American Mining Congress, Colorado Springs, Colo., September 17, 1940.

finished section 7 x 9 feet to accommodate a 60-in. scraper.

Slope of Slusher Drifts:

The former drifts were driven on a plus 15 percent slope. Various slopes have been tried, and it has been determined that the flat drift is preferable to those with a slope. The flat drift decreased wear of rope over muck pile, allows better entry of scraper into hopper, allows better sight of operation from hoist, allows more storage of ore in drifts and hoppers, and makes forming for concrete easier; it also makes development easier and operation safer, and makes available a somewhat greater tonnage above the Phillipson Level, thus eliminating costly hoisting of the increase of tonnage which would otherwise be hoisted from a lower level.

Slusher Platforms:

The former platform, as shown in Figure 2, was 34 feet long and had the slusher hoist mounted on the end, and the 72-in. hoe-type scraper was used. The present standard platform is 17 feet long and the slusher hoist is mounted permanently in the middle of the platform, and is raised 15 inches above the original sides of the platform on I beams. The present platform layout is shown in Figure 3. The 60-in. semi-box-type scraper is used, and is pulled under the hoist to discharge.

The reason for this change was to decrease the amount of excavation and timbering needed for the slusher hoist installation, and thus avoid excessive weakening of the ground, and to decrease cost of installation. This decrease of installation cost amounts to about $2,600 per slusher hoist installation, or about 1.5 cents per ton.

The former slusher hopper bottoms were put in on a plus 15 percent grade, while the present hopper bottoms are flat. It was found that the former hopper hole of structural steel, battered, bent and was demolished quickly. A liner of old grizzly rail is now placed in this hole and has almost entirely remedied this condition.

Slusher Hoists:

Hoists were formerly 150 hp. with a rope speed of 300 feet per minute. This speed was found to be too fast, and was reduced to 250 feet per minute and a 100-hp. motor is used.

Scrapers:

The hoe-type 72-in. scraper is still standard for footwall work in hard rock where large drifts can be driven and maintained.

In other areas where the ground is not strong enough for large drifts to be maintained or where the ground must be concreted to hold it, the semi-box-type 60-in. scraper is standard.

Slusher Drifts and Grizzly Chambers Concreted in Weak Ground

It has been determined that the large 7 x 9-ft. slusher drifts described by Mr. Romig (MINING CONGRESS JOURNAL, November, 1937) are suitable and are still used for hard ground only. For weak ground this size of drift is too large to be maintained. Timber sets would not support the ground as it was weakened by the excessive amount that had to be excavated for installation. These timber sets were replaced by steel sets to give additional strength and decrease the amount of excavation necessary for installation. The steel sets proved unsatisfactory due to the fact that any timbering up the draw fingers from the steel sets could not be maintained, because of the necessary continued heavy blasting of hangups in the fingers. When this timbering was blasted out, spalling of back and ribs caused ground to cave away from the steel sets leaving them unsupported on three sides.

The use of concrete was considered, and extensive investigation of methods of placement were made. It was finally decided to place concrete by the use of the Rex No. 160 pumpcrete machine. This pump will deliver concrete through a 6-in. line a distance of 800 feet horizontally or 100 feet vertically at a rate of about 15 yards per hour. It was planned to concrete grizzly chambers, which are about 60 feet above the Phillipson Level, from that level, as well as slusher drifts and fingers which are about 10 feet above the level.

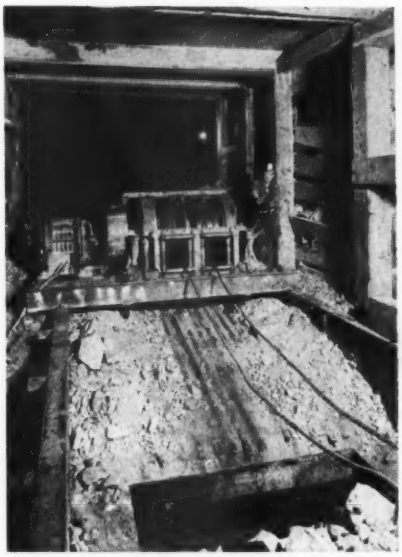
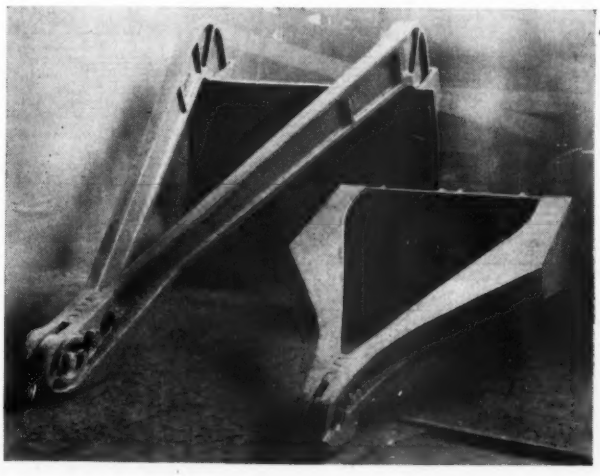


Fig. 2. Former slusher platform with hoist mounted at one end

The following equipment was purchased for this work:

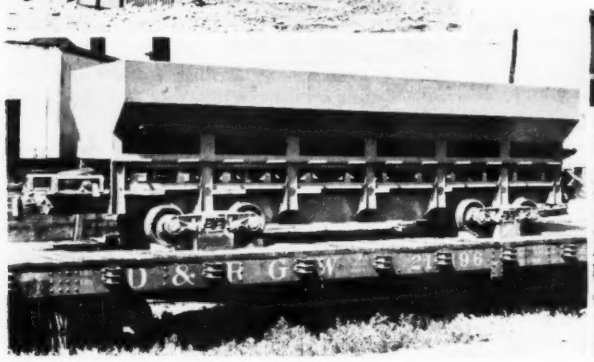
1 Rex Pumpcrete, converted for mine use	$5,587.75
1 27 ft. x 20 in. portable conveyor, converted for mine use	1,176.05
1 108 concrete mixer, converted for mine use	1,783.25
3 Batch aggregate cars	10,987.41
1 Car puller, installed	663.30
1 2 compartment aggregate storage bin with weighing batcher, not erected	3,359.63
1 Bucket elevator, not erected	3,685.40
Erection of bin and elevator	2,359.41
Track	506.91
Grand Total	$30,109.11

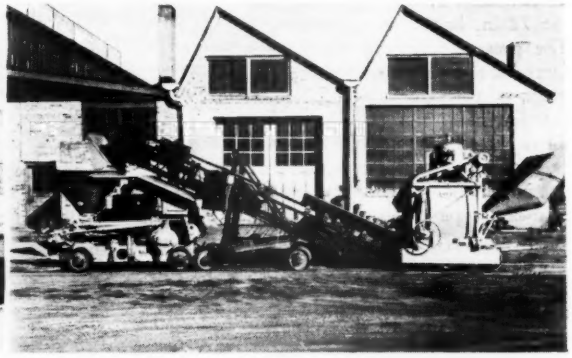


Standard 72-in. hoe-type scraper

Upper. Pumpcrete end of underground concreting plant

Left. Two-compartment aggregate storage bin with weighing batcher





Left. Batch aggregate car with belt feed to mixer pan

Right. Concrete mixing and placing equipment coupled up for service

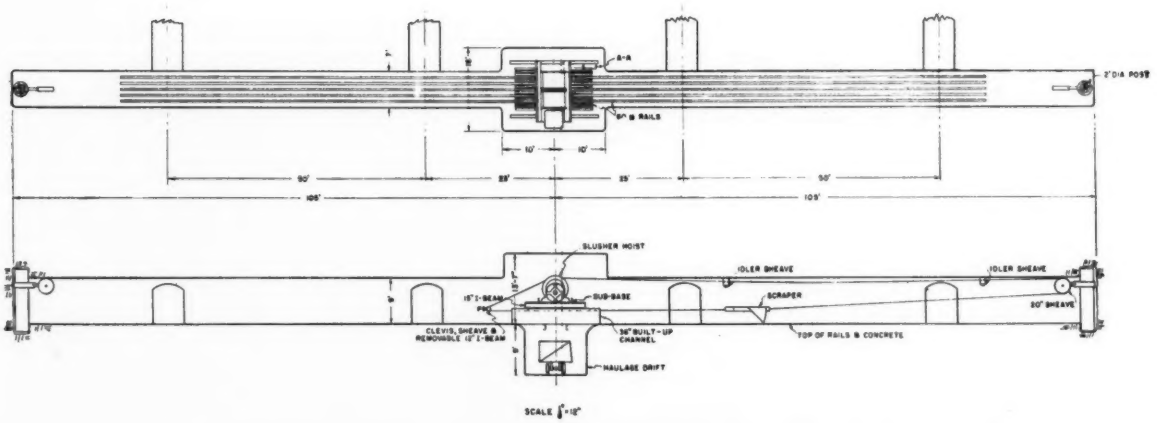
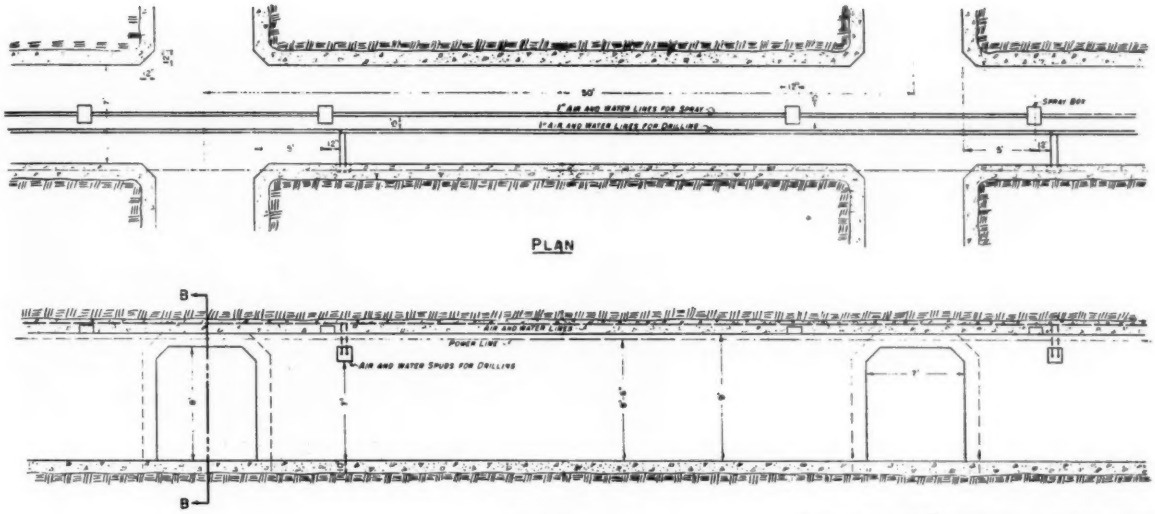


Fig. 3. Standard slusher drift layout. Sides, bottom and top of slusher drift are concrete 1 ft. thick. The lower 12 ft. of fingers are also concreted



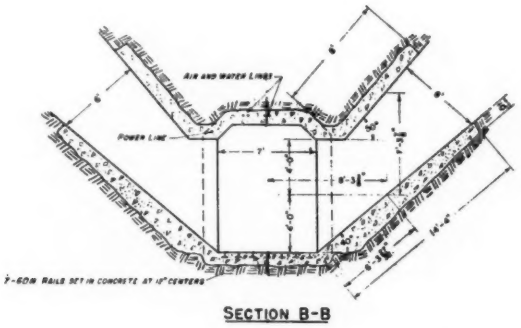


Fig. 4. Slusher drift concreting details. All concrete 12-in. thick unless otherwise noted. Concrete reinforced with ⅝-in. round, 6-in. mesh

All of this equipment except aggregate bin and elevator is mounted on mine car wheels, and fixed with suitable couplings so that it may be moved separately or coupled together to form a train. The batch aggregate car was designed by the Climax staff in conjunction with several equipment engineers. All other equipment is standard and all movable equipment is powered with 275-volt d.c. motors to receive electrical power from the mine trolley lines.

Slusher drifts are reamed to the desired size, formed, reinforced with deformed reinforcing rods ⅝ inch in diameter placed on about a 6-in. mesh, and poured by the use of the pumpcrete equipment. Details of slusher drifts are shown in Figure 4. Old 55-lb. relayer rails are laid in the floor of the drift and fingers on about 1-ft. centers and covered with concrete. (See Figure 2.)

As is to be noted, slusher drifts are provided with a pocket which contains air and water lines for block holing of rocks, also, slightly ahead of the center of fingers two water spray lines are installed for spraying of ore. Air and electrical connections are placed at rear of slusher drifts to provide air for blowing and electricity for lighting. Also, idler pulleys are placed in the back of the drift to support the tail rope.

Grizzly chambers are reamed to the desired size, formed in similar manner and poured by pumpcrete equipment mounted on the Phillipson Level with discharge pipeline going up the chute raise. It is found that the Rex No. 160 pumpcrete will easily place concrete at least 80 feet above the Phillip-

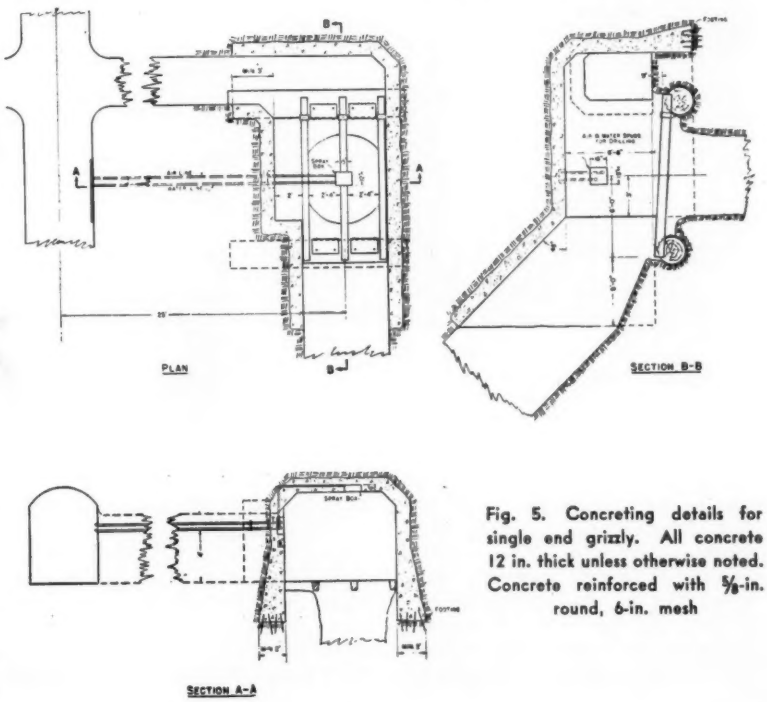
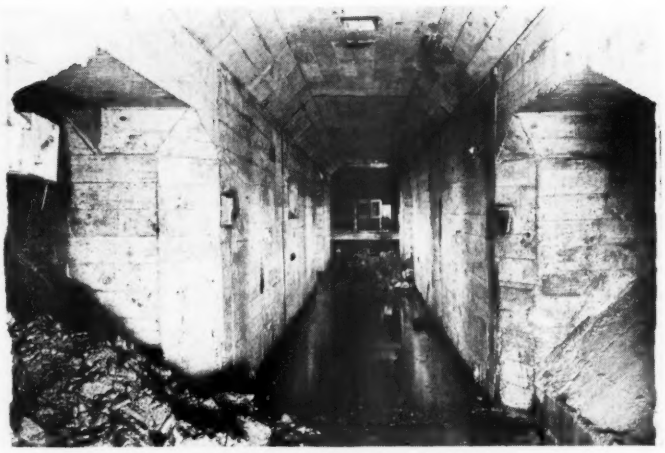


Fig. 5. Concreting details for single end grizzly. All concrete 12 in. thick unless otherwise noted. Concrete reinforced with ⅝-in. round, 6-in. mesh

View looking up a finger



Slusher drift looking toward hoist

Slusher drift showing tail sheave and back pair of fingers

Slusher drift with hoist installed, rails in place on near side for pouring floor

View from hoist down completed drift showing scraper operations

son Level. Provision was made for boosting with compressed air at each bend of the discharge line, but this has proved unnecessary. When pouring the back of an arch, compressed air is turned into the pumping line near the discharge and forces the concrete into the crown of the arch. See Figure 5.

Provision is made in the grizzly chambers for air and water lines for block holing and for water sprays for dust elimination.

Up to November 1, 10 slusher drifts and 7 grizzly chambers have been concreted, and a substantial tonnage drawn from them. From the first two slusher drifts concreted, 168,681 tons, or 71 percent of the expected tonnage has been drawn with a small amount of wear on the concrete. It is certain that the concrete will last until all the expected tonnage is drawn. From the first two grizzly chambers 120,322 tons, or 61 percent of the expected tonnage, has been drawn with the same results. For this preliminary work, wooden forms were used; for future

Placing concrete forms in grizzly chambers

work, steel forms will be used. It is believed that upward of 500,000 tons may be pulled from concreted slusher drifts without major repairs.

Steel Forms and Aggregate Cars Will Reduce Concreting Costs

The cost of concreting without the use of aggregate cars and with the use of wooden forms, up to November 1, 1940, is given in the following tables. Cost of concreting with the use of aggregate cars and with steel forms will run $2.00 to $3.00 per yard under these figures.

SLUSHER DRIFTS
(*Concreting cost per cubic yard placed*)

Reaming		$1.85
Labor	$1.57	
Supplies	0.28	
Forming		$4.55
Labor	$2.94	
Reinforcing steel	0.76	
Lumber and steel forms	0.85	
Concreting		$11.71
Labor	$2.77	
Sand	1.70	
Gravel	1.87	
Cement	5.20	
Pumpcrete supplies	0.17	
Form removal		$0.51
Grand Total		$18.62
Labor	$7.79	
Supplies	10.83	

A total of 5,271 cubic yards were poured at a total cost of $18.62 per cubic yard making available 1,285,018 tons at a cost of 7.639 cents per ton.

GRIZZLY CHAMBERS
(*Concreting costs per cubic yard placed*)

Reaming		$1.76
Labor	$1.39	
Supplies	0.37	
Forming		$4.17
Labor	$2.98	
Reinforcing steel	0.16	
Lumber and steel forms	1.03	
Concreting		$10.65
Labor	$2.32	
Sand	1.57	
Gravel	1.69	
Cement	5.07	
Form removal		$0.27
Grand Total		$16.85
Labor	$6.96	
Supplies	9.89	

A total yardage of 920 cubic yards were poured at a cost of $16.85 per cubic yard making available 705,808 tons at a cost of 2.196 cents per ton. Of the tonnage made available, 497,656 tons have been shipped.

Concreting of slusher drifts and grizzly chambers promises to be the solution of the very difficult problem of supporting heavy weak ground where much heavy blasting is required to pull the caved ore. It allows the installation and maintenance of water sprays for elimination of dust, air lines for block holing and auxiliary ventilation and permanent lights. To date, concreting has proved entirely satisfactory.

The cost of maintenance is expected to be lowered in excess of the original cost of concreting.

Defense Price Curbs Drafted

The National Defense Advisory Commission has prepared drafts of a series of executive orders which the President can issue to combat uncontrolled price inflation.

The orders were prepared after the Commission's Price Stabilization Division had catalogued all of the President's statutory powers available for a fight against dangerous price rises. This survey showed that many commodity prices were not susceptible to direct regulation and must be stabilized by indirect methods.

Among the most powerful indirect weapons were said to be the Administration's power to revise tariffs through trade agreement, and its authority to accumulate stocks of important materials which could be held over the markets as a deterrent against price rises. Numerous powers contained in emergency legislation of the last war and in many New Deal measures were also stressed by observers.

A large part of the nation's vast, complicated price structure was now being held at "proper" levels by means of "paper clips and rubber bands," one official said.

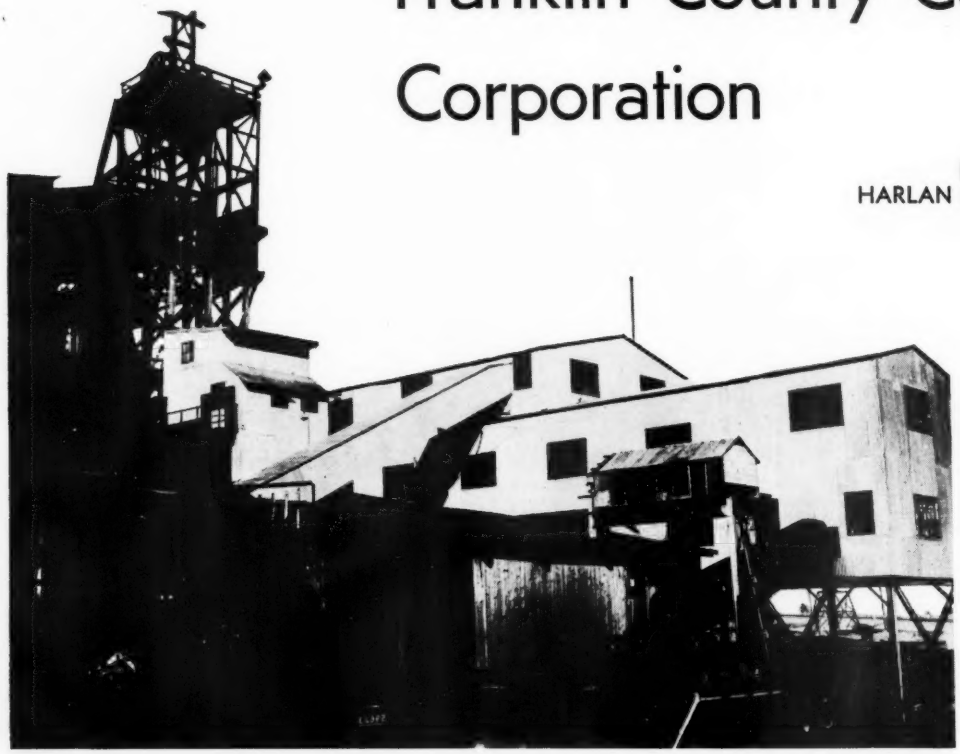
But, he added, it was holding, and probably would continue to hold for some time.

Depending on the size of defense appropriations made by the next Congress and the rate of British purchases, the time might be reached when the Administration would ask Congress, the Defense Commission official indicated, for a clear statement of the Administration's power to control prices against inflation.

The Defense Commission already has purchased 100,000 tons of Latin-American copper to meet a threatened copper shortage through a national stock pile of imports. The stock pile would insure an ample supply of copper for all needs without requiring priority for Army and Navy orders, and the price increase that probably would follow such priority.

The Royalton "Solid Fuel Refinery" of Franklin County Coal Corporation

By
HARLAN E. OEHLER*



New plant at Royalton

MINE No. 7 of the Franklin County Coal Corporation is located at Royalton, Franklin County, Ill. Coal is mined in the Herrin No. 6 seam at a depth of 320 feet from the surface. The daily output averages about 4,200 tons in seven hours. The mine is located in an area of extremely low sulfur content, and the coal is well known for its high quality on both industrial and domestic markets.

Modern Cleaning Plant Installed in 1938

During the summer of 1938 the preparation facilities at Royalton were augmented with the installation of a modern cleaning plant designed and erected by the Koppers-Rheolaveur Company. The new plant has enabled the company to provide its customers with a lower and more uniform ash product, higher ash fusion temperature and improved size consist. During the summers of 1939 and 1940 dedusting and dewatering facilities were added to meet the increased demand for stoker sizes, so that now the entire mine output smaller than 3 in. can be crushed and rescreened for stoker use.

* Formerly Preparation Engineer, Franklin County Coal Corp.

Unique "Refinery"

The Royalton "Solid Fuel Refinery" is unique in that it employs two types of cleaning units not previously used in the Middle West. A 10-ft. Koppers-Menzies Cone Separator cleans the coarser sizes, and the fine coal is cleaned in two 28-in. Koppers-Battelle Launders. The plant is compact yet flexible in operation in order to meet varying market conditions.

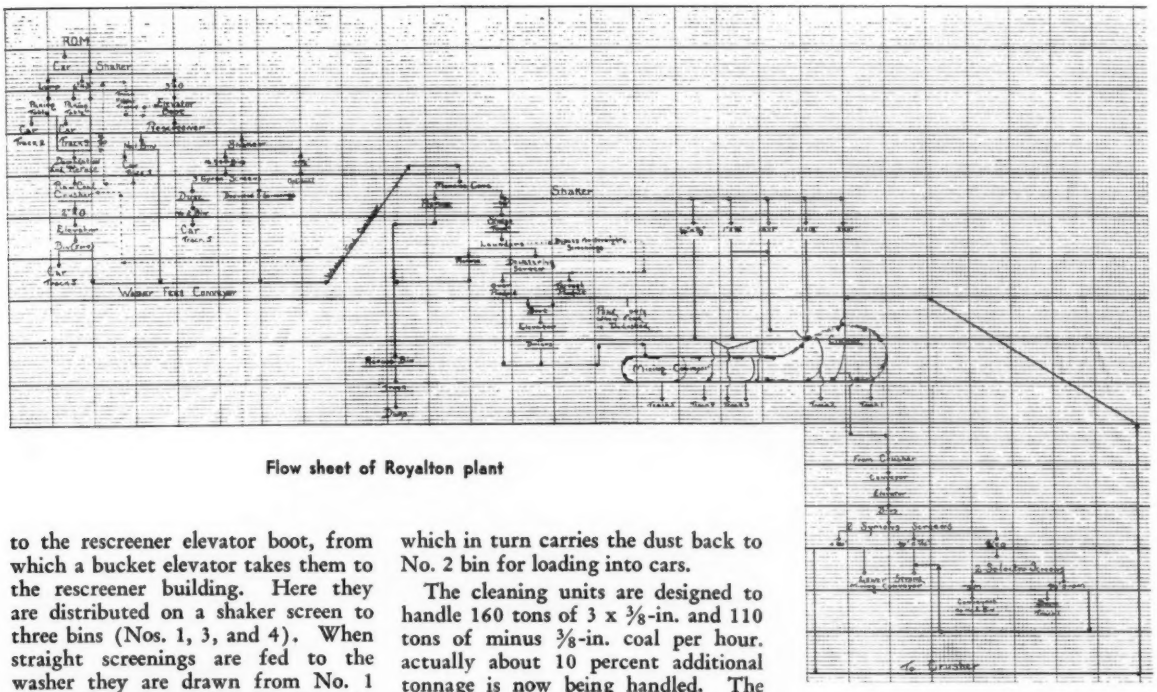
A flow sheet is shown in Figure 1. The coal, hoisted in pit cars holding about 4 tons each, is dumped into a hopper and weighed. From there it passes either into railroad cars as mine run or onto a 7-ft.-wide shaking screen, where it is separated into three sizes: 6-in. lump, 6 x 3-in. furnace, and 3-in. screenings.

The lump is hand picked on a 60-in. conveyor, which serves both as a picking table and as a loading boom. Furnace is hand picked on two 54-in. shaking picking tables, which discharge onto a 36-in. belt loading boom. The discharge ends of the picking tables are equipped with 3-in. round hole degradation screens and deflatter angles to remove thin flat pieces.

Crushing and Screening

Pickings from the lump pass through a rail grid having 8-in. square holes. These join the pickings from the furnace and are crushed to minus 2 in. in a No. 30 American ring crusher. The crushed product is elevated to No. 4 or 5 bin in the rescreener building for feeding to the washer.

The 3-in. screenings are dropped through a chute from the main shaker

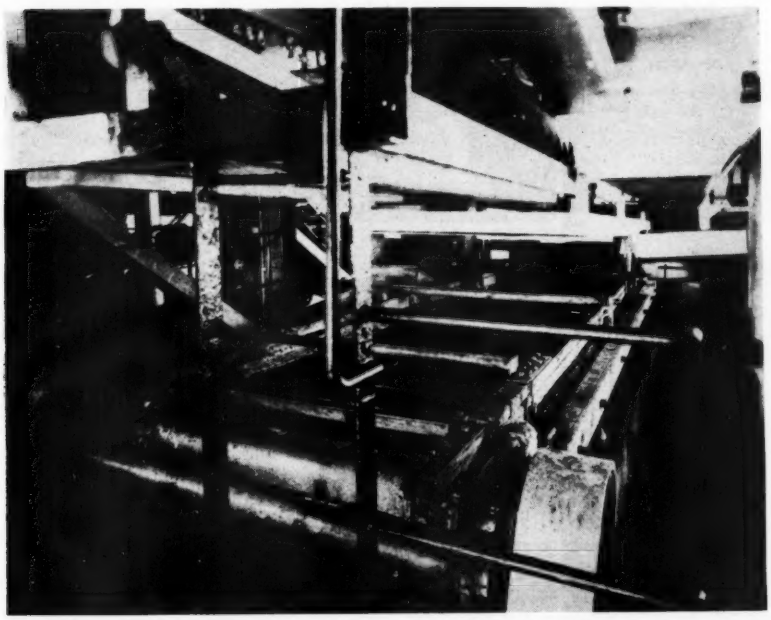


Flow sheet of Royalton plant

to the rescreener elevator boot, from which a bucket elevator takes them to the rescreener building. Here they are distributed on a shaker screen to three bins (Nos. 1, 3, and 4). When straight screenings are fed to the washer they are drawn from No. 1 bin. When the washer feed is to be dedusted the coal is drawn from bins 3 and 4 over three Gyrex vibrating screens. The amount to be drawn is controlled by reciprocating feeders.

The three dedusting screens discharge into the washer feed conveyor, which has two compartments. One compartment carries the feed to the top floor of the washer, and the other carries the dust to another conveyor, which in turn carries the dust back to No. 2 bin for loading into cars.

The cleaning units are designed to handle 160 tons of 3 x ⅜-in. and 110 tons of minus ⅜-in. coal per hour. actually about 10 percent additional tonnage is now being handled. The balance of the 3-in. screenings or overflow coal, which cannot be washed on the day shift, are loaded from No. 1 bin into hopper cars. These are dumped on the night shift into a track hopper, from which a reciprocating feeder carries the coal to the rescreener elevator boot. The elevator returns the coal to the rescreener building and ultimately to the washer feed conveyor.

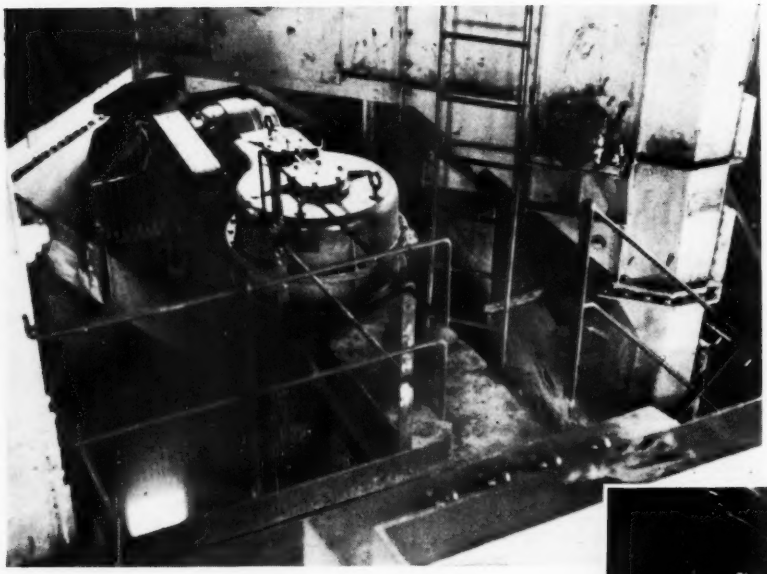


Symons dewatering screen for minus ⅜-in. coal

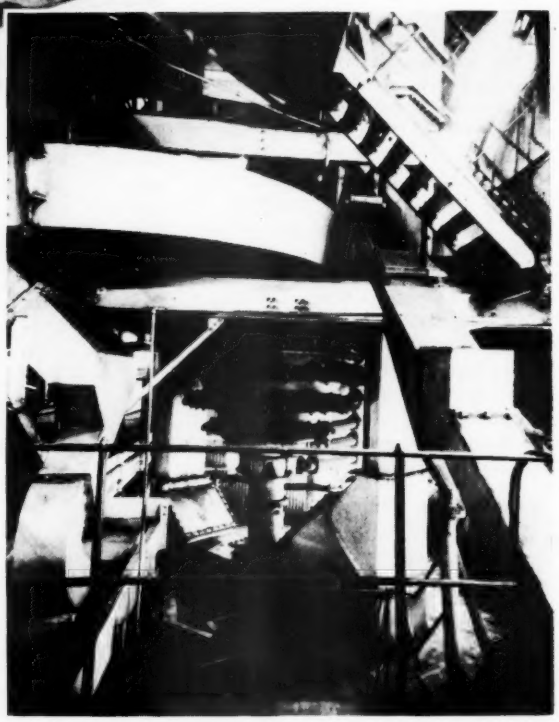
On the night shift the raw overflow coal may at selected times be crushed so that all passes through a 1½-in. hole. This is accomplished by dropping the plus 1½-in. coal through a chute to the pickings crusher, from which it is elevated to No. 4 bin. This arrangement allows the dedusting of the crushed product when making stoker sizes.

Cone Makes Cleaned Coal and Refuse

The washer feed is sprayed with water as it drops through a chute to the feed well of the cone separator. The cone makes two products: cleaned coal and refuse. A bed of intermediate gravity material is formed, from which the refuse falls against a rising current to be withdrawn continuously by a bucket elevator. The elevator completely surrounds the cone, and its casing serves as a pressure reservoir for the water rising in the refuse withdrawal pipe. An adjustable weir maintains the proper level of water in the casing and adjusts the flow of water rising in the refuse withdrawal pipe to the amount of refuse in the cone. The amount is reduced when the refuse content increases allowing the refuse to discharge more rapidly. Water is introduced to the cone at seven levels through valves. The cone requires about 5,500 gallons per minute of recirculating water, which is



Above—Looking into Koppers Menzies cone



Right—Arrangement for distributing water to nozzles in cone

supplied by a 12-in. centrifugal pump.

Screen Plates of Stainless Steel

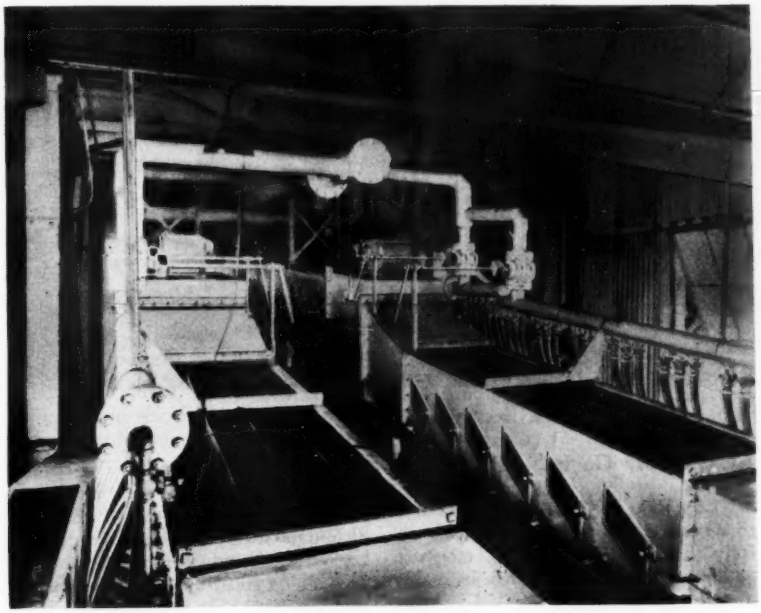
Refuse from the cone is discharged through a chute to the refuse bin. The cleaned coal is sluiced to an 8-ft. wide double section shaking screen, which is equipped with 2, 1½, 1¾, and ⅜-in. round-hole screen plates, the last being stainless steel. Other screen plates are being replaced with stainless steel as they wear out. Sizes above ⅜-in. are discharged directly onto a double compartment mixing conveyor.

The minus ⅜-in. coal and water are sluiced to a sludge tank located on the first floor of the washer. The water overflows to a pump sump for recirculation through the cone. The fine coal is recovered on a 5-ft. drag conveyor and elevated to the top floor, where it falls through a dividing chute to either or both launders.

Operation of Launders

The launders make three products: cleaned coal, middlings and refuse. Each launder has 20 upward current boxes. From 10 to 14 are used for making refuse and any or all of the balance for middlings. The launders may be thought of as a combination of stream and hindered settling classifiers. A more or less compact bed of refuse lies on the bottom between the boxes. Over the boxes the bed is in a fluid state because of the upward current, which forces any lighter coal particles back into the flowing stream. Thus a relatively sharp separation can be made. The box products are discharged through rotary draws into sluices. The draws are operated from a common connecting rod through ratchets and wheels, so that the rate of removal can be changed to suit individual conditions. A Reeves drive allows the speed of all the boxes to be changed as a unit to meet varying tonnage conditions. A pyralin window at each box enables the operator at all times to control the character of the product being withdrawn. Middlings are returned to the sludge tank, and the refuse is dewatered in a bucket elevator before going to the refuse bin.

The cleaned minus ⅜-in. coal may be sluiced to a 5 x 16-ft. single deck Symons screen equipped with a stainless steel cloth or directly to a carrying pan under the screen. When a cleaned dedusted product is desired the washer feed is dedusted in the rescreener building, and the dust in the cleaned coal resulting from degradation and imperfect screening is removed by the dewatering screen and sluiced to the sludge pond. At these times the over-product is discharged directly onto the mixing conveyor, which has three sections of milled plate installed in the bottom to provide additional drainage. When straight screenings are desired no prededusting is done, and the cleaned minus ⅜-in. coal is sluiced under the screen to a conical boot designed to waste the bulk of the minus 48-mesh material in the overflow water. A bucket elevator carries the coal from the boot to the top floor, where it is discharged over a wedge-wire screen to two AR-1 Carpenter Driers. The drier product falls directly onto the mixing conveyor, and the effluent is returned to the cleaned coal boot.



Koppers-Battelle launders

New Rescreening Plant

At selected times any or all of the cleaned sizes over ¾-in. may be crushed in a type AC3-A American ring crusher. The crushed product may then be rescreened in a new plant built during the past summer. The new equipment was designed by the Robins Conveying Belt Company and has made it possible to load a dry washed 7/16-in. dedusted product without the use of a heat drier. The washed 3 x ¾-in. coal, which carries relatively little surface moisture, is crushed and elevated to two surge bins equipped with reciprocating feeders. These discharge onto two 4 x 14-ft. Symons screens equipped with ¾- and 7/16-in. decks. The oversize is returned to the crusher, and the ¾ x 7/16-in. size is returned to the mixing conveyor to be mixed with the ¾-in. screenings. The 7/16-in. x 0 from the Symons screens is dedusted over two 5 x 10-ft. Selectro screens equipped with music wire cloth. The dust is conveyed back to the No. 2 bin in the rescreener building. The 7/16-in. dedusted product is carried in a screw conveyor to a belt loading boom. This same boom is used to load 3 x 2-in. coal when it is not being crushed.

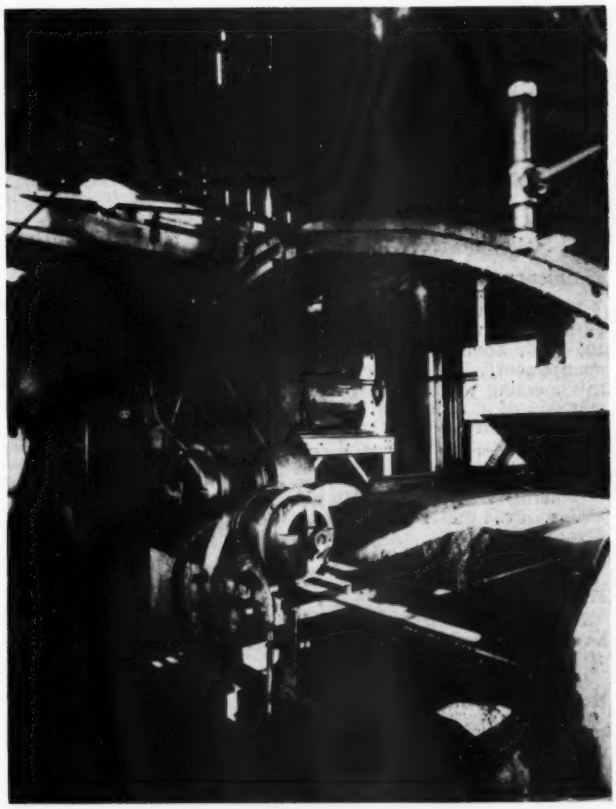
The new rescreening plant also allows the loading of a fully dedusted screening of any size by crushing the oversize and returning the dedusted crushed product to the mixing conveyor. In this case the oversize on the Symons screens is returned to the mixing conveyor instead of the crusher. The crusher is then set to control the desired top size.

Mixing Conveyor Serves Five Tipple Tracks

The mixing conveyor serves all of the five tipple tracks. However, during the day only two of these are available for loading cleaned coal, which at that time consists of 3 x 2-in. small egg or 7/16-in. buckwheat on track 1, and screenings or ¾-in. stoker coal on track 4. The other three tracks are used for loading lump, furnace and raw or overflow coal. On the night shift track 4 is utilized for dumping, while the other four may be used for loading cleaned coal, which may be any size or combination of sizes under 3 in. Sizes below 2 in. are loaded by means of "pant-leg" chutes, which prevent the coal falling between cars when changing from one car to the next.

Dust-Proofing

Any or all sizes may be dust-proofed by the Viking Hot-Vapor Process. Lump, furnace and small egg are sprayed in chutes or, in the case of the loading booms; smaller sizes are sprayed in chutes or, in the case of the 7/16-in. dedusted product, in a screw conveyor. An oil of from 220 to 280



American pulverizer, AC-3A ring crusher

Lump picking table

Control laboratory

S.S.U. viscosity is used in the winter and of from 350 to 450 S.S.U. in the summer.

Use of Water

All water from the plant, consisting mainly of that used by the launders, is sluiced to a sludge pond. After settling has taken place the clarified water is pumped to a head tank on the top floor of the washer for reuse. About 1,750 gallons per minute are returned, of which 1,400 are required by the launders. Makeup water is sprayed on the main dewatering shaker. Refuse is hauled away to a dump by a 9-yd. Auto Car truck equipped with a down-folding tail gate which may be used as a bulldozer.

Laboratory Control of Washer

The washer is operated under laboratory control. Samples are taken regularly for float and sink, ash, moisture and size analysis. Control is maintained at a level such that 96 percent of the ash analyses of individual cars lie within plus or minus one-tenth of the average desired ash value. Feed samples are taken periodically to check plant efficiency.

Heating the Buildings

Buildings housing the preparation facilities are heated with Modine unit heaters. The sludge tank, cone refuse elevator and cleaned coal boot are equipped with steam inlets to prevent freezing in severe weather. No trouble has been experienced with ice in the 600-ft. sluiceway to the sludge pond, although it is not insulated. Lines carrying the dustproofing oil have companion steam lines to insure proper temperature at the nozzles.

Performance of Washer Highly Satisfactory

The performance of the washer at Royalton has been highly satisfactory. Raw coal carrying from 10 to 12 percent sink material has been consistently cleaned to from 1.5 to 2 percent sink at the same gravity. Loss of saleable coal in the refuse is almost negligible, the ash of the refuse varying from 60 to 65 percent.

1941 National Safety to Be Held in Chicago

The National Safety Congress is to be held in Chicago from October 6 to 10, 1941, according to a recent announcement. The Mining Section for this meeting will be under the chairmanship of J. J. Forbes, of the U. S. Bureau of Mines.

The officers for 1940-41 include the following:

General chairman, Cadwallader Evans, Jr., the Hudson Coal Co., Scranton, Pa.

First vice chairman, W. D. Haselton, Pickands Mather & Co., Duluth, Minn.

Second vice chairman, N. P. Rhinehart, West Virginia State Department of Mines, Charleston, W. Va.

Third vice chairman, John Treweek, Homestake Mining Co., Lead, S. Dak.

Secretary and News Letter editor, Daniel Harrington, U. S. Bureau of Mines, Washington, D. C.

Engineering committee chairman, M. L. Coulter, Clearfield Bituminous Coal Corp., Indiana, Pa.

Health committee chairman, Dr. A. L. Murray, U. S. Bureau of Mines, Pittsburgh, Pa.

Membership committee chairman, L. C. Campbell, the Koppers Coal Co., Pittsburgh, Pa.

Poster and slide committee chairman, J. J. Forbes, U. S. Bureau of Mines, Pittsburgh, Pa.

Statistics committee chairman, W. W. Adams, U. S. Bureau of Mines, Washington, D. C.

Entertainment committee chairman, J. T. Ryan, Mine Safety Appliances Co., Pittsburgh, Pa.

Program committee chairman, J. J. Forbes, U. S. Bureau of Mines, Pittsburgh, Pa.

Members at large: J. W. Alt, Calumet & Hecla Consolidated Copper Co., Calumet, Mich.; P. M. Arthur, American Zinc Co. of Tennessee, Mascot, Tenn.; G. J. Barrett, Oliver Iron Mining Co., Duluth, Minn.; Fred E. Bedale, Consolidation Coal Co., Inc., Fairmont, W. Va.; John L. Boardman, Anaconda Copper Mining Co., Butte, Mont.; Angus D. Campbell, McIntyre Porcupine Mines, Ltd., Schumacher, Ontario, Canada; W. H. Comins, Baroid Sales Div., National Lead Co., Texarkana, Tex.; M. L. Coulter, Clearfield Bituminous Coal Corp., Indiana, Pa.; C. M. Fellman, the Montreal Mining Co., Montreal, Wis.; C. W. Gibbs, Duquesne Light Co., Pittsburgh, Pa.; R. Dawson Hall, *Coal Age*, McGraw-Hill Publishing Co., Inc., New York, N. Y.; H. T. Harper, Tennessee Copper Co., Copperhill, Tenn.; H. C. Henrie, Phelps Dodge Corp., Bisbee, Ariz.; Thomas E. Lightfoot, the Koppers Coal Co., Pittsburgh, Pa.; George Martinson, Pickands Mather & Co., Cleveland, Ohio; C. E. McKnight, Lake Shore Gold Mines, Ltd., Kirkland Lake, Ontario, Canada; William G. Metzger, the Hudson Coal Co., Scranton, Pa.; D. D. Moffat, Utah Copper Co., Salt Lake City, Utah; V. O. Murray, the Union Pacific Coal Co., Rock Springs, Wyo.; R. H. Seip, the New Jersey Zinc Co., Franklin, N. J.; L. T. Sicka, St. Joseph Lead Co., Bonne Terre, Mo.; Howard I. Young, American Zinc, Lead & Smelt. Co., St. Louis, Mo.

PROGRESS in *Milling Practice and Equipment**

By BANCROFT GORE
Professor of Metallurgy
South Dakota State School of Mines

THE one dominant thought in the minds of all of us at this critical period, when our form of government is threatened from within and without, is the part that our mineral dressing industry can take in the national defense program. Everyone knows the essential part that metals and alloys have taken so far in modern warfare both aggressive and defensive, but the public does not know that our ore dressing industry, that vital and increasingly important link between the natural resources of the mine and the reduction plant producing these metals, is fully prepared, operating as it does and always has 24 hours a day and seven days a week, to meet any and all requirements for the major base metals, iron and steel, copper, lead, and zinc, needed for national defense.

Inasmuch as each ore is a definite problem in itself requiring a specially prepared flowsheet derived from careful research, ore testing and if possible pilot mill operation, one cannot be expected to draw up a list of equipment and tell the world that this is the last word in mineral technology.

The situation is perhaps best covered by a remark from an official of the Phelps Dodge Company to a prominent visitor who had come for information on its 1,500-ton pilot mill operations using ore from the already famous Morenci pit. I quote: "We are trying to work out the best solution for our *own* problem and have no recommendations to make for other ores."

Must Adjust Technology to Changing Ore Conditions

What we all know, and must aim to adjust our technology to, is that as the years go by, the quality of our ore or rather what we care to call ore these days, is dropping and the combined efforts of prospecting by mule and geophysics have failed to find any considerable tonnage of high grade ore that will essentially alter this trend. It is a condition, like ladies' hats, that we have to take as is; in one case, all we can do is to pay for them if financially able, in the other case by continued research, application of new processes, improved equipment, and last, but not least, an increasing cost consciousness that looks to savings of cents and fractions of a cent in each and every one of the items making up milling costs, we can go ahead pushing back the frontier of future ore supply and lifting billions of tons of marginal material into the field of metal production. This includes, of course, waste ore dumps, tailings piles, and stope fillings left us by past generations when values in ore were high and recoveries low.

How conditions have changed in the field of gold ores, so far as grade and tonnage per day are concerned, is brought to light by a clipping from the *Custer City Chronicle*, Dakota Territory, December 18, 1876. "The Hidden Treasure Mine has a Ball Pulverizer that is doing good work, the ore yielding over $50 per ton. This mine is near Gayville on Deadwood Gulch.

"Nichols & Havens, at Golden Gate, have a 20-h.p. engine, crusher and four arrastras and are operating their works day and night. They average crushing 12 tons per day, and will clean up about the middle of January with an indicated yield of $150 to the ton.

"The Pinney Brothers of Nebraska City, on the Woolsey mine near Central City, have an A1 10-stamp mill, in first-class working order in full operation. Their mine shows ore that will net $200 or more per ton.

"The Homestake claim is an extensive body of ore. By arrastras the mine is good for $60 *per ton.* The locator is putting up a 10-stamp mill and running a 300-ft. tunnel to tap the vein."

What kind of ore most of our copper is recovered from is common knowledge, thanks to Mr. Arthur B. Parson's excellent book on Porphyry Coppers now in its third edition, but we must realize that the future for zinc, lead, quicksilver, manganese, chromium, and particularly iron and many non-metallics like fluorspar, feldspar and phosphates must follow the same pattern of large scale, low grade operations. I quote Mr. E. W. Davis, an authority on Lake Superior iron ores in his recent national research project report where he says: "Concentration processes will be increasingly important in the future. Iron ore concentration will eventually replace the direct shipping ore now obtained from the *rapidly decreasing reserves* of high grade ore. The future of the steel industry along the Great Lakes and in the Pittsburgh District will depend upon the production of constantly increasing tonnages of concentrate from the Lake Superior District."

As you all know, this Lake Superior District is producing over 85 percent of the total iron ore in the United States.

A similar situation in our most important Tri-State zinc area, which produces about 38 percent of the zinc in ores mined in this country, is summed up by the leading operator in these words: "The trend has been and will undoubtedly continue to be toward

* Presented Annual Metal Mining Convention, Western Division, the American Mining Congress, Colorado Springs, Colo., September 17, 1940.

large-scale operations. Both economics and high salvage value of depleted ore reserves scattered over wide extent make such procedure mandatory if our district is to live long. The central milling scheme is the very life of our current mining problems. *Ores progressively become leaner as time marches on, thus challenging the ingenuity of our entire technical staff."*

Must Keep Up Cost Studies

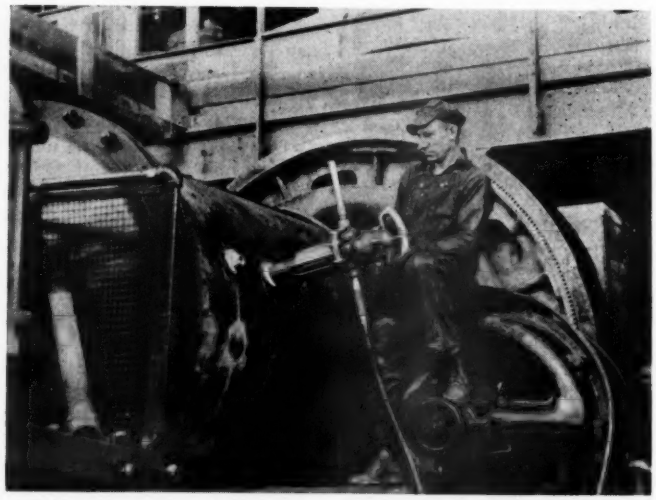
Nobody questions the network of economic dilemmas that make this time one of hesitation and doubt, for along with a changed attitude by present authorities at Washington toward business and especially individual initiative (the very heart of progress) and the penalizing of profits from venture capital which has made possible every notable development in our branch of industry, we have lowly pegged metal prices and increasing quantities of scrap of all kinds salvaged to such an extent that our metal refineries now take the place, to a considerable degree, of our mines and mills. Then there is heavy importation of crude metals, smelting ores and concentrates from countries having lower living standards but richer and more extensive ore deposits, all tending to complicate an already difficult domestic and foreign situation. New taxes now take a larger part of income and prospective shortages of skilled labor and material cloud the picture. Under all the circumstances the best line of defense is not to wire our Congressmen but to keep up our study of operating costs, and I think I speak for all of you when I state that never before has there been such an interest at an annual convention of this kind in equipment and methods that will pull down unit costs and push up efficiency and particularly metal recoveries. To the operator of a large mill, some device that will lower the quantity of metal in tailings by as little as .01 percent or cut down a cent a ton in maintenance looks interesting. To the small operator of a gold mill, lowering of his tailings by .005 oz. per ton has a real appeal. And again, some little device like the new pneumatic impact wrench is designed to do its part in reducing maintenance cost and repairs. One large operator informs me that his time and labor in relining ball and rod mills has been cut in two by this apparently trivial gadget. Another operator at a 450-ton cyanide mill with the same idea in mind also cut his relining time in half by installing a 1-ton portable remote controlled electric hoist primarily for lifting liners in and out of the ball mill and reloading in less than two hours the 30-ton ball charge.

Manufacturers Striving to Meet Operating Needs at Every Turn

I sometimes wonder if our younger generation of mill operators do not take too many things for granted, much as the colored boy who on a warm summer day finds his way to a corner of the cornfield and there sees a large, ripe watermelon inviting his critical attention, a gift from Heaven, something that just growed with no effort involved. Behind the present unbelievably high standard of milling equipment there has been over 50 years of continuous applied effort, working under our competitive economic system which has suffered such terrific attacks during the past seven years, and this effort on the part of the equipment manufacturer or engineering firms has been and is today striving to meet the requirements of the operator at every turn. This is a slow, costly and more often than otherwise a disappointing and money-losing experience, but the end result is one of the most remarkable situations in all engineering. Much remains undone, but the mill of today has heavy duty units; time out for repairs has shrunk to such an extent that most foreman shift reports do not carry such a heading. Maintenance costs, while still a vulnerable item, are ridiculously low under modern conditions, compared to what we had in days when we tried to keep 40 stamps dropping, or a Huntington or Chile mill in motion a week without bearing or roll troubles. Ball and roller bearings find increasing applications. The old line-shaft and troublesome broadbelt drives are gone, in favor of direct-motor or V-belt drives. Wear-resisting rotary pumps replace troublesome bucket elevators, attendance on machines to keep them adjusted and lubricated has dropped to an all-time low; for instance, two men on shift below the crusher house can now run a 350-ton all-sliming, fine-grinding decantation cyanide mill. This one item of labor economy may turn out to be a lifesaver, with the calling of our citizens to military training or their removal to what they imagine will be a more abundant life in industrial centers now becoming active with orders for national defense.

Efforts Made for Greater Simplicity in Design

Flow of materials tends to be more uniform as well as continuous, and the best practice now undertakes to place it all under centrally located controls increasingly automatic—for examples, the new pulp density controller, the weightometer, the electric ear, and calibrated reagent feeders—all adjusted for maximum performance. Equipment is now designed to make any replacements to wearing parts a matter of hours in place of days, and these wearing parts are being provided from an increasing number of wear-resisting steel alloys or molded rubber. Lubricants are provided to meet each type of service, and bearing troubles once the headache of the operator are fading. Dust recovery, safety protection, proper lighting, heating, ventila-



Ingersoll-Rand Potts impact wrench in action relining a 5 x 10-ft. Allis-Chalmers rod mill at the mill of the Homestake Mining Company

tion, and clean, attractive mill interiors are here for good. In general, there is an effort for greater simplicity in the design of all equipment, fewer moving parts and a more compact arrangement of the separate units, with the ultimate aim, worth the study of every concentrator engineer, of a one-man control at a central station common to the whole mill if it is under 500 tons capacity or to a single section in the case of the larger mills.

Larger Storage Capacities

More consideration is given to larger storage capacities, both above and below the crusher units, and these crushers work faster than ever. It is not easy to sell the idea of large bins and oversized crushers to the smaller operating companies, but at several new mills that have come under my observation lately I find one answer to the Wages and Hour Act to be a 40-hour crusher between a 48-hour crude ore bin and a 72-hour fine-ore bin. Under this system, with the requisite cooperation from the mine, the mill can by Friday afternoon, after the completion of five eight-hour shifts, run well into Monday on its reserve of fine ore, while the crusher crews enjoy their two-day hunting and fishing trips, without pay, made available to them by special act of Congress.

Small Mills No Longer Equipment Proving Grounds

One item of progress shows up these days, and that is the small mill, often to its ruin, is no longer the proving grounds for new processes and equipment. Twelve years ago I took part at the funeral in Denver of a fantastic process, that, according to the inventor, only needed a full-sized milling unit to extract gold from shale which, according to him, contained this gold in a physical condition so unusual that it did not yield to fire assay methods! The scenic value of the highways through our Western mining camps is marred by the ruins of desolate mill buildings, often of great size, where poor investors' savings were risked and lost in the name of types of equipment and processes even wilder than what I have just mentioned.

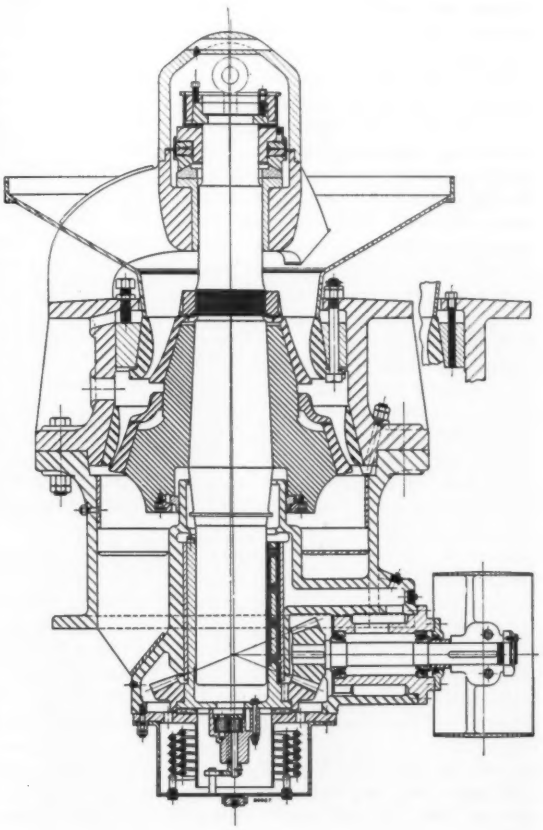
Many of these ruins mark the spots where there never was sufficient ore for even an arrastra nor any reasonable chance for ore. There is a changed attitude on the part of machinery salesmen to refrain from taking part in a waste of capital funds by recommending their equipment at locations where there is little or no ore or where the ore treatment problem has not been properly worked out by competent metallurgists.

Commercial Scale Tests Being Conducted by the Larger Companies

This was a terrific economic loss and harmful to legitimate mining undertakings. It is a sign of far better days and real progress in our industry that the larger companies are willing to test out on a commercial scale appliances and processes that look all right, but may turn out to be too full of bugs to be as efficient in the long run as standard equipment operating alongside under identical conditions. Often, however, by continued alterations to the design of untried equipment a valuable article results and the milling industry as a whole benefits, providing reliable publicity is given the tests by the engineers in charge.

Only the large companies with spare equipment can do this work, because in case of failure of the unit under test, the small mill having no other unit in operation suffers the loss of production caused by delay in changing to standard equipment.

I have in mind a series of tests now in progress where the object in view is to determine the comparative value of a new kind of ball and rod mill liner that can be manufactured on a quantity basis from plain steel, consequently at an interesting price per pound. A 90-day trial run in a 5 ft. x 10-ft. Marcy rod mill loaded with 12 tons of 3-inch rods showed certain weaknesses in original design, improper cushioning against the mill shell and undesirably high ratio of scrap to new metal. These were changed by the manufacturer to meet the ideas of the operator and a new trial run started. When this run ends (and it has been in progress for more than a year) results compared with costs of standard linings in adjacent mills, figured in cents per ton of product milled, may be such as to call off the tests and to forget about them; or, what now seems more probable, this liner may point the way to lower grinding costs to every grinding mill, wet or dry.



Traylor-Stearns multi-stage fine reduction crusher

Role of Laboratories and Pilot Mills

Laboratories and small pilot mills have their part in new developments, but the real test of anything new is in the mill itself alongside of standard equipment, where comparative operative costs can be figured. So little is ever said of the time, effort, money and initiative needed to make an inventor's idea, a millman's dream or a draftsman's phantasy grow to a commercial success that will run 24 hours a day and show added profits to the owner that it somehow seems important to call attention to this situation to explain that, while the first cost of good equipment seems high (and it

usually so appears to the purchasing agent), it is reduced operating costs, low maintenance, increased output and recovery that count in the long run.

Crushing

In the field of crushers, the trend in the large mills seems to be toward doing more crushing by two or three stages, leaving the ball mills to do the grinding—that is, the tendency seems toward a finer feed to the ball mills which opens the possibilities of a return more generally to single-stage grinding, for flotation work at least; again a definite trend in the direction of simplicity of design. The almost universal opinion of the various mill superintendents at the large copper mills in the West is that the ball mill is not suited for doing with best efficiency any considerable fine crushing and fine grinding at the same time. Where finances permit, there is a strong tendency for two-stage crushing in the smaller mills, although just where the economical limit of mill capacity for the reduction crusher to fit into the flowsheet is open to argument, some stating that the mill of 150 tons can show far better operating results with a primary and reduction crusher and soon pay for the secondary crusher out of decreased operating costs and increased tonnage capacity.

In a recent alteration job to a 350-ton mill in the Black Hills, putting in a 3-foot reduction crusher below the primary gyratory resulted in a reduced power consumption, a smoother operation of the grinding units, more uniform ball mill feed, less steel consumption, smaller grinding balls needed, and increased capacity of grinding units.

The large heavy duty crushing rolls seem to be losing ground to the reduction or short head gyratories, although their performance at several leading mills surpasses all competitive equipment where the rod or ball mills take a comparatively fine feed. Operators complain about the high maintenance of rolls, especially when in closed circuit with elevators and trommels. Two-stage roll fine grinding ahead of tabling in the lead mills of eastern Missouri, and zinc mills of the Tri-State district is still the accepted procedure, but it is interesting to note that with the coming of the differential density cone process of separation at the 10,000-ton Central Mill of Eagle Picher and the 2,700-ton Mascot Mill of the American Zinc, Lead and Smelting Company rolls have given way to reduction crushing evidently because the new separation process is taking a product remaining on a ⅜-inch round hole for Mascot and 3/16-inch woven wire cloth for Central, sizes well within the range of efficiency of a combination of the standard and short head crushing cone units.

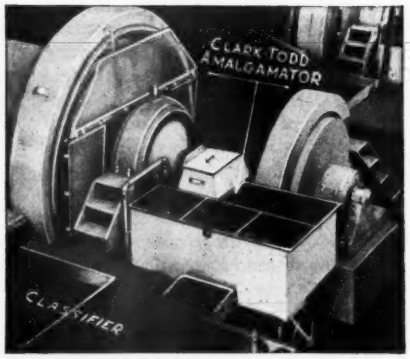
A rather interesting development concerning which nothing has so far been published is that of the replacing of dry grinding in rolls at two mills in the Black Hills of South Dakota by dry rod milling, in each case with a hard, fine textured refractory gold ore ahead of the roasting operation. These are 4-foot rod mills with specially large discharge openings, with a limited number of 2½-inch rods, and operate in closed circuit with a four-mesh screen in one case and a nine-mesh in the other. Advantages are mainly extremely low maintenance, reduced dust losses, and more uniform product.

Looking back over the last ten years, we are impressed with the remarkable development of crushing equipment, particularly for delivery of finer products. The faster operation of these units and continual refinements in design are giving us better grinding operations in ball and rod mills, while their astonishing output makes the crushing department more generally a one-shift operation. An interesting new design in the fine reduction field is one with the crushing head comprising two separate mantles of different diameters assembled one above the other with a common head center, the effect being two superimposed short heads, thus undertaking to offer a two-stage unit without the usual vibrating screen common to the standard types in general use.

It is one drawback with reduction crushers in general, unless operated wet, that most sticky ore limits their proper performance, and this has stimulated manufacturers of screens and screening equipment to develop some highly efficient units of the low-head vibrating type for use ahead of them.

Grinding Equipment Trends

In the field of grinding equipment, many of the larger companies are looking into the merits of the 10-foot diameter ball-mill for capacities of round 1,500 tons per day feeding an all minus 1-inch or ¾-inch crusher product for separation down to minus 65-mesh. This shows the trend toward fewer operating units for the same capacity and also confidence in the rugged construction with minimum time out for repairs and usual replacement jobs such as new liners and scoop noses, for obviously standby units tie up heavy capital.



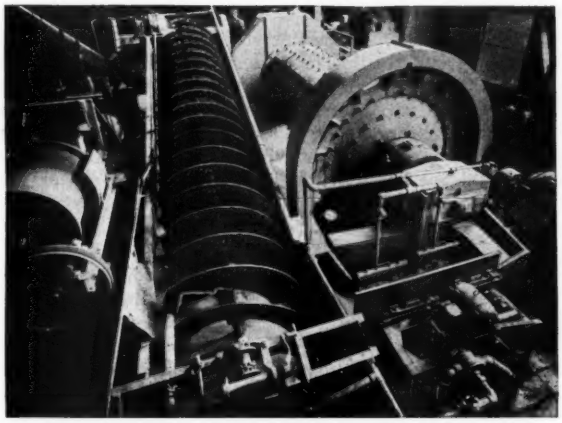
The Clark-Todd amalgamator operating in closed circuit with grinding mill for efficient and safe recovery of free gold

Consideration everywhere seems to be to reduce to a minimum *over-grinding* and as a consequence we find an effort to get the pulp discharged quickly by various devices, thus build-up circulating loads 500 percent or more and throwing a heavy load on the classifier. Even in fine dry grinding as in cement, we find this same effort by exhaust fans and air separators *to get the undersize out of the system* before over-grinding develops.

The opinion of our mill superintendents is that classification is far cheaper than grinding and that any given mill should have a classifier of sufficient size and efficiency in closed circuit with it to get the maximum possible tonnage at the desired separation out of the mill circuit. The designer of classifiers has been faced with the dilemma of combining a reliable material conveyor with a suitable settling pool. Competition has often prompted an installation of a unit having scant conveyance capacity and insufficient pool area, but in newer plants and in the remodelling of older ones a more conservative attitude is now evident toward selection of the classifier than formerly.

Steel Consumption Costs

Steel consumption commands attention at every plant, being one of the largest cost items in the crushing and grinding departments. The metallographist has come to our assistance by the development of new wear-resisting alloy steels and cast irons and by scientific heat treatment of these for mill liners, roll shells and grinding balls. The subject of proper size and com-



A mineral jig installed in the ball mill grinding circuit removing values early in the process

position of grinding balls is highly complex, having so many economic variables such as railroad freight, ownership of a foundry, type of crushing and grinding units, that the trend, if any, is hard to estimate. (The age-old system of trial under one's own conditions is costly and usually only available to the large mill, as it alone can buy in carload lots.) For grinding balls the trend seems to be toward the use of the smaller sizes, down to even 1½-inch diameter, and this has opened the way for many mills to adopt either a plain white-iron chill-cast or an alloyed white cast iron ball, particularly where they can use scrap in their own foundry. Many swear by plain carbon heat-treated forged balls, while others get lower costs from heat-treated forged alloy steel. Steel mills, foundries and physical metallurgists are giving the matter greater attention than ever. There is an effort to build up the carbon content and develop uniform hardness in steel balls by use of such combinations of alloys as nickel and chromium, chrome and molybdenum and molybdenum copper, to cite a few instances. Hard surfacing by welding methods is now almost universal as a means of reducing replacement costs for parts subject to severe abrasion.

In steel liners for rod and ball mills the rule seems to be to use the manganese liner where there is heavy impact from large balls or heavy rods; this, of course, surface hardens the liner. Mills using, say, a 2-inch ball, either cast or forged, find lower costs in a plain white or meehanite white cast iron. The situation is confused by several of the larger mills with world records for low costs making their own liners from, for instance, imbedded rails, the interstices filling during service with fragments of the grinding balls. Another makes its own white iron liners with long slots which also fill with fragments of the chilled cast iron balls. These are clever schemes to keep away traveling salesmen and help, of course, to start a depression in one branch of the equipment industry.

What is needed soon, in view of the approaching scarcity of many of the ferro-alloys, is another symposium by millmen on their experiences with liners and grinding balls and especially results from comparative tests referred to earlier, such as are now in progress by Homestake Mining Company and the adjacent Bald Mountain Mining Company, where the plain but high carbon rolled steel liner is pitted in each case against standard manganese steel.

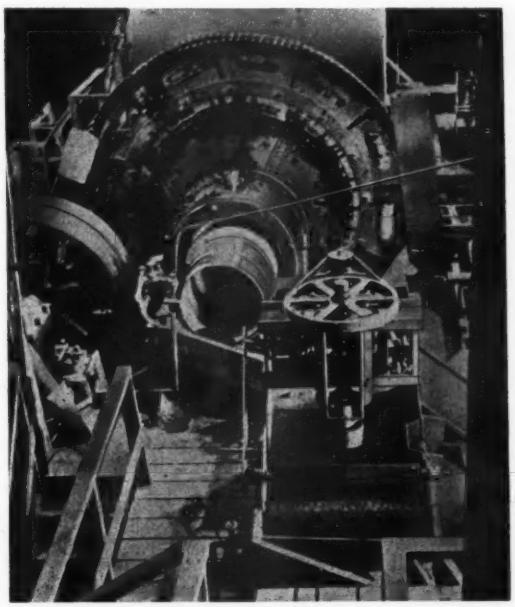
Advances in Flotation

Flotation continues to advance over an ever-widening horizon, its latest attainment, so far as national defense program is concerned being the selective separation of the non-metallic mineral, manganese carbonate, rhodochrosite, from complex sulphides and its further separation from gangue constituents, mainly quartz, to give a concentrate pure enough and particularly low in sulphur to be sintered into nodules for melting to ferro manganese. This in outline is the basis of the process developed after several years of research and pilot mill operation by the Anaconda Copper Mining Company for its 1,000-ton plant under construction at Anaconda, Mont.

In the field of non-metallic flotation rapid strides are being made. Two new plans for upgrading limestone for cement manufacture have been put into operation, bringing the number of plants to a total of 11 of this type. The European war has, of course, increased the interests of domestic producers in the possibilities of beneficiating many ores previously considered too low grade to compete with the usual high grade imported material among which are quick-silver, tungsten, lithium, vanadium, magnesite and boric acid.

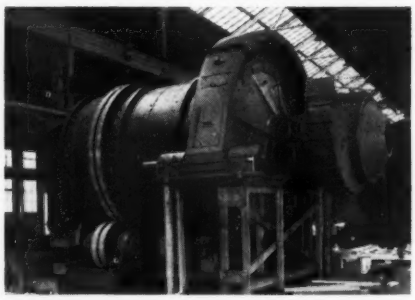
In connection with flotation there is a tendency, where tonnage permits, to avoid too fine grinding at the start by changing to coarser grinding, followed by floating a rough concentrate which goes to a separate regrinding department. This follows practice established by Climax Molybdenum, and it is interesting to note that producers of other metals are giving it much consideration in planning alterations and for new mills.

Large-scale test work appears to have brought about some very interesting changes in flotation machine de-



A unit flotation cell removing coarsely ground concentrates in the grinding circuit

sign, at least for very large units, as a result of the different manufacturers trying to keep ahead in the competition where increased recoveries of 1.0 percent were vital. The tendency is for the different mechanical machines to approach a common basis, viz., a level tank with a weir overflow at the tailing end and impellers spotted along the tank at regular intervals. This removal of compartments is said to give better control of the pulp for large operators. In any event, we note more attention to a control of air to each cell, the use of roller bearings on the impeller shafts driven by V-belts from ball-bearing motors, inside wearing plates of manganese steel or molded rubber, rubber-covered impellers and devices for more complete diffusing of the controlled air through the impellers, items that obviously improve operation and lower maintenance. In fact, refinements in design are so rapid that an operator hesitates to make a selection, thinking that next month he may get in on a far better model.



Modern large capacity Marcy open end mill

This race by the manufacturers is typical of the industry as a whole, giving it acknowledged world supremacy in every line of mining and milling equipment. We know it does not happen under any other form of government, be it national socialism, dictatorship, or just plain war against business, large and small, whereby initiative and incentives for continued improvement are blocked off and progress detoured over dirt roads. In place of rewards for extra effort on the part of individuals and adequate returns for their savings invested in corporations carrying on these undertakings, there is an attempt to penalize their work and their legitimate profits by syphoning these profits by taxation into a common fund dedicated to the uplifting of a minority group of so-called under-privileged. These under-privileged, so far as I have been able to determine during the past 40 years, have never taken any active part in this astounding conquest of natural resources through the application of scientific knowledge, research and the best that all branches of engineering can offer.

Sink and Float Process Prospects

Now, the achievements at Mascot, Tenn., and Picher, Okla., in the commercial development of the sink and float process raise the question for mineral dressing as a whole as to whether our flowsheets should not be rechecked to see if extraction of the major portion of the values cannot be had nearer the start of our systems and at coarser mesh, in fact, ahead of the costly grinding process and in the form of a coarse bulk concentrate with reject to waste of the resulting coarse and impoverished tailing. This leaves for any subsequent grinding and selective separation by jigging and/or flotation a considerably reduced tonnage of a grindability usually much easier than the rejected gangue. Type of mineralization, not so favorable, of course, in our western mining districts of disseminated sulphides, is a basic determining factor for this study. The tendency of some of the valuable brittle minerals to slime and break down into fine particles, even under dry crushing, takes them out of the present range of separation using the sink and float process, that is, by suspension in mediums heavier than water. Yet the basic simplicity of separation cones and above all their tremendous capacity for original coarsely crushed feed per 24 hours per square foot of cone area (30 tons at Picher and 41 at Mascot), the low power, chemical reagent, and attendance requirements, force us to the opinion that the prospects for further developments in this direction, not only for coal, low-grade iron ore and many types of coarse-grained sulphides, but a large number of the heavier non-metallics such as separation of cassiterite from the pegmatite minerals and chromite from gangue minerals (to give two strategic minerals as examples) can be looked for.

Sound metallurgy also requires, whenever possible, to make our recovery at as near the point and time of mineral liberation as can practically be accomplished, and this accounts for a trend toward the use of high speed jigs, unit flotation cells and amalgamating boxes, as at Homestake, in the closed circuit of grinding mills.

The predominant part that flotation now has in milling operations has not prevented successful operators from using certain more primitive systems of ore beneficiation that like the differential density separation process are sound metallurgy in that they undertake at low cost to discard as waste a considerable part of ore well ahead of any fine crushing, grinding and flotation; three operations that bear heavily on the profits from treating extremely low grade material. I refer to hand sorting as at the Alaska Juneau, selective screening at the Yellow Aster, log washing and screening of iron ores and phosphate rock and selective coarse grinding of soft hematites to remove a valuable slime product, also the use of hydroseparators for removal of a valuable granular or slime product, as the case may be.

Application of High Speed Jigs

The application of high speed jigs thus far has been mainly in the field of ores having a high ratio of concentration, usually metallic gold, and in such work their capacity per square foot is comparable to those of the differential density cones, viz., 25 to 75 tons of original feed per 24 hours and again with low power requirements and maintenance.

What they really do is to scavenge out any free fine gold or liberated high specific gravity minerals before they get returned by the closed circuit of the grinding system for further wasteful regrinding, but they do this with an unclassified pulp, while the cone process depends on a properly sized, washed and deslimed feed. The high speed jig has an uncanny way of removing from the fast flowing pulp a large part of the freed high specific gravity fine particles regardless of size, provided they are not in the slime range, and this degree of recovery is as we might expect at its maximum for a very high gravity and non-sliming mineral like native gold, recovery of which in many cases is substantially completed in the grinding circuit without recourse to amalgamation. Its expansion into the field of sulphide removal during grinding for ores having a lower ratio of concentration would be another approach to the metallurgists' ideal of early stage removal of values which can then pass to regrinding and recleaning operations.

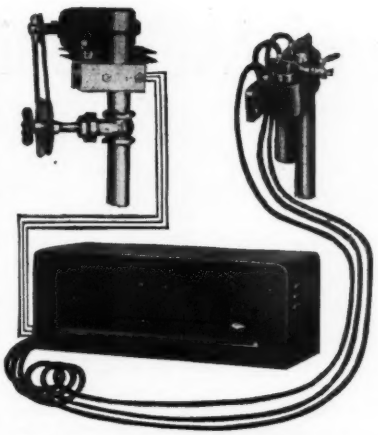
Gold Recovery

In the field of gold recovery we note a trend toward lowering the alkalinity

when milling with cyanide solutions, this giving in many cases but not invariably a higher extraction. It has long been realized that high protective alkalinity, although favorable to slime settlement, in some way reduced gold recovery. Now with the use of causticized starch in quantities as low as 1/10 lb. per ton of ore milled, thereby replacing burnt lime as a settling reagent, the way has been cleared for dropping the alkalinity to as near neutrality as operations will allow. By the clever use of delicately adjusted slacked lime feeders in the ballmill circuit and at the agitators, combined with frequent hydrogen ion determinations of the mill pulp at classifier overflow and outlet of agitators, alkalinities as low as 1/50 of a pound of lime per ton of mill solution, corresponding approximately to a pH of 9.5 are possible. For such careful control work as this it is interesting to note that portable industrial instruments are now available for continuously measuring electrically with high accuracy and speed the pH content of mill solutions in cyanide and flotation systems. This is one example of a line of scientific instruments developed for the chemical industries, but of unquestioned value in the control of pulp through the up-to-date concentrating or cyanide mill.

The use of caustic starch to accelerate settling and clarification shows some increase, but its action is often erratic and sometimes unsatisfactory from a cost standpoint. Where settling area is insufficient because of the desire for increased tonnage or finer grinding, or presence of more oxidized ore and colloidal material in the pulp, it has given in one instance surprising results.

An operator of a counter current decantation plant, forced to increase his tonnage milled, found that his primary settlers had adequate area, but the bottle neck was his secondary series which had about two-thirds the area



The Massco Adams automatic density controller for regulation of pulp densities in milling systems and heavy density fluids as in differential density cones

for conditions under the increased tonnage. Research work developed that by dropping the alkalinity to one-fourth the customary strength and adding starch at the rate of 1/10 lb. per ton of ore, these settlers could do the work of the larger primaries. In practice the curious situation developed that the potency of the starch disappears in each thickener, so the quantity was proportioned to each thickener in series at its inflow. Overflows cleared up, burnt lime consumption dropped 500 lbs. per day, and a costly alteration job involving both building, foundations and larger series of tanks was avoided. There was, however, no increased extraction of gold noticed, as at other plants that had shifted to almost neutral cyanide solutions.

Increasing Employment of Research and Testing Engineers

It is a positive sign of continued progress in mill operations that even the smaller undertakings in almost every instance now employ a graduate research and testing engineer, supplementing the usual assayer and chemist, and that he works in a laboratory fully equipped with ore testing equipment of the latest design. In recognition of this situation the mining schools are establishing new courses in all branches of mineral dressing, ore testing, microscopy of ores and even pilot mill operation, that they may help and continue to serve this big industry so vital to a civilization, more and more dependent on the use of metals.

Editor's Note: Professor Gore's address on this subject was followed by descriptions of the MBI—Sink and Float Process, by Elmer Isern, chief metallurgist and general mill superintendent, Eagle-Picher Mining and Smelting Co., and by Patrick Butler, vice president, Butler Brothers, covering the process as previously described at the Eagle-Picher Lead Company, American Zinc, Lead and Smelting Company, and Butler Brothers' plants, in the February, July and September issues of MINING CONGRESS JOURNAL.

—*Discussion*—

By T. G. CHAPMAN

Dean, College of Mines
University of Arizona

MY DISCUSSION will be confined to a few brief remarks on points of particular interest to the Southwest.

Professor Gore referred to the experimental work of the Anaconda company in the flotation of manganese carbonate.

During the World War I had a small part in the production of manganese in the Southwest, and during the past year have been in contact with experimental work conducted for the purpose of determining the possibilities of concentrating certain low-grade Arizona manganese ores, and these contacts have resulted in opinions as follows:

Although some manganese was produced in Arizona during the World War, it should be remembered that this ore was produced largely from old silver workings where the manganese was exposed during early operations for silver. The exposed manganese ores were mined, hand-sorted, and shipped. A small tonnage of concentrates was produced by roll crushing, jigging, and tabling.

Production of manganese in an emergency in Arizona today would be confronted with an entirely different situation as compared to 1917 and 1918. The exposed ores in silver workings are gone, and deposits which show promise of considerable tonnage are lower grade. These lower-grade deposits contain finely divided manganese oxides intimately associated with gangue, and in at least one deposit some of the gangue is calcareous—a condition not encouraging for concentration by flotation.

From results of experimental work on a few ores it is almost certain that these ores are not readily amenable to concentration by flotation. The necessity of fine grinding is the rule, and the concentrates which have been obtained to date are rather low grade.

In an emergency it is likely that some concentrates can be produced, providing the cost is not of primary importance, but manganese cannot be produced quickly, as was the case in 1917-1918, as production must be dependent upon developing a mine and erecting a concentrator.

The situation is more favorable in

(*Continued on page* 50)

Some Effects of Mechanization Upon Conservation of Coal Deposits†

By ALBERT L. TOENGES
Supervising Engineer
Coal Mining Section, Mining Division
Bureau of Mines
Pittsburgh, Pa.

THE introduction of loading devices into coal mines has made it necessary to adapt them to the system of mining in use or to alter the mining systems to fit the machines, in order that they may be used efficiently. The investment necessary to equip a mine for mechanical loading is great, and to reduce the fixed charges per ton the working area should be so planned that maximum recovery can be obtained from a given territory. Changes in the mining systems in some areas have effected a higher percentage of recovery than was possible under hand-loading methods. Thus, in these districts the introduction of mechanical loading has been a factor in improving the percentage of recovery.

Rate of Extraction Rapid With Mechanical Loading

Studies by the U. S. Bureau of Mines indicate that the rate of extraction usually is more rapid where the coal is loaded mechanically than where hand-loading methods are used. Roof conditions are likely to cause less trouble where extraction is rapid, as the coal generally is removed before the full effect of the roof action is operative. Pillars that normally would be left to support the roof in working places can be withdrawn, in many instances, where rapid retreat from the area is possible. The room-and-pillar system of mining, with some variations, is the most common system used in coal mines. Where pillars are not withdrawn recovery ranges from 50 to 60 percent, and at mines where coal from pillars is extracted recovery ranges from 80 to 95 percent. In some districts the use of conveyors with self-loading heads in dipping coal beds has permitted the withdrawal of pillars that otherwise would have been lost and thus has resulted in an increased percentage of recovery of the bed. Thus the use of mechanical equipment under these conditions has resulted in conservation which could not have been attained economically and safely with hand-loading methods.

More coal has been recovered in some sections of mines in districts where pillars are not recovered because rapid extraction of coal resulting from mechanical loading has permitted full recovery of coal in rooms. Large tonnages have been lost owing to the caving of rooms where the roof has been exposed for longer periods.

Pillar Extraction

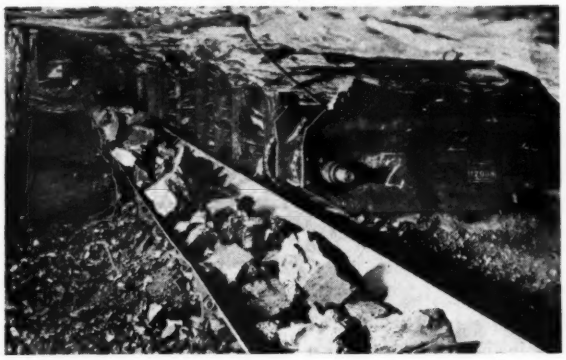
In some districts pillar extraction is not practical because of the value of the overlying surface. The withdrawal of pillars results in subsidence of the surface, with attendant decrease in the value of agricultural land. Operators who own mineral and coal rights but not surface rights have been reluctant to permit the surface to subside and be subjected by the owner of the surface to costly damages.

Recovery of Cuttings

Mechanization has brought problems to the industry, particularly with reference to the output of a product free from foreign impurities. The mobile loading machine, unlike the hand miner, cannot separate impurities from the broken coal at the face, but loads the coal irrespective of the impurities in the bed, which necessitates the erection of cleaning plants at mines. Coal cuttings that had been discarded at some mines are now loaded and cleaned successfully. Cuttings often contain a high percentage of fine-size coal and impurities from the bed. As the cut ranges from 4 to 6 inches or more in width, the loss from cuttings where they are not loaded is a high percentage of the total thickness of the bed where the bed is thin. Thus, the necessity of cleaning mechanically loaded coal makes possible the recovery of cuttings that had been discarded previously at some mines. The recovery

Tramming into room

† Published by permission of the Director, Bureau of Mines, U. S. Department of the Interior.



A conveyor handling lump coal

per acre at such properties has been increased materially.

Mechanized Loading to Make Possible Mining of Thin Beds

Because of the high cost of mining thin coal beds 18 to 34 inches thick by hand mining methods, some districts were threatened with abandonment. The introduction of long-wall mining systems that result in approximately complete extraction of the bed and the installation of mechanical loading devices have revived the industry in these districts and permit the recovery of a high-grade fuel that could not otherwise have been mined economically. The Paris field of Arkansas and some areas in Alabama are examples of such conditions. It is believed that as thicker beds of coal are depleted, thin beds can be mined economically by the introduction of mechanized devices for loading the coal.

Careful Planning Essential

The rapid development of loading equipment, however, has added to the complexity of mechanical mining. Careful planning is required for the return of capital invested in equipment before obsolescence occurs. Coordination of all operations is necessary. A study of methods coordinating transportation with loading is essential and should show the way to increase output per unit and hence reduce the cost per ton. The ultimate success of mechanization depends on thorough understanding of the problems involved and coordination of all operations — cutting, breaking down the coal, timbering, loading, and transportation.

Strip Mining Progress

Strip mining is mechanized mining. In recent years there has been rapid progress in the technique of mining coal by this method. In states where the topography of the area and the depth to the coal bed are favorable for stripping, the production of coal by this method is a large percentage of the total—for example, consider the production of strip coal from bituminous mines in Illinois, Indiana, Missouri, Kansas and Oklahoma. The advances in stripping practices have made this method of mining a decided factor in the conservation of coal deposits. The recovery of coal in underground mining in states where strip mining is important ranges from 50 to 60 percent. Strip mining recovers the maximum amount of coal from a given area (approximately 75 to 95 percent) and is a means of preventing waste of a natural resource that cannot be replaced.

Where the coal beds lie at depths as much as 60 feet from the surface (at greater depths for short distances) the stratum or roof above the coal bed is generally friable and difficult to hold. Under these conditions, the cost of underground mining makes it difficult to compete with coals from mines having more favorable natural conditions, and mines have been abandoned or operations greatly curtailed in some districts. Some of these areas have since been returned to production by stripping methods.

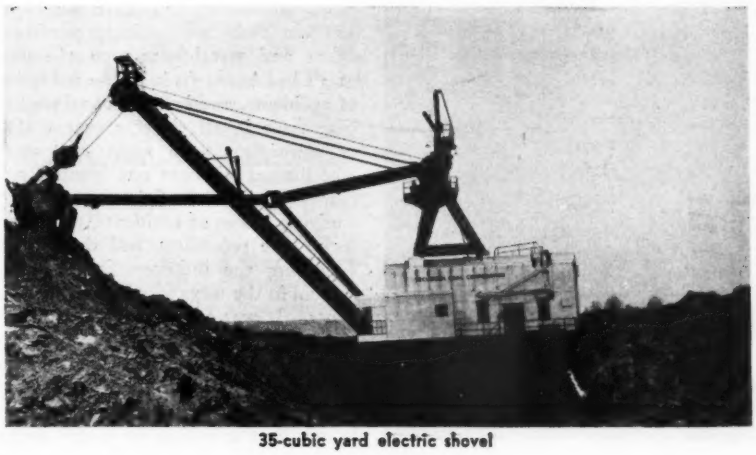
Thin beds of coal—that is, 14 to 24 inches thick—lying at shallow depths are being mined succesfully by strip-mining methods. It is doubtful whether physical and economic conditions would ever be such that these beds could be mined by any other method.

Reclamation of Stripped Lands

A contraphase of conservation in strip-mining is overturning of the land, which makes it useless for a time. The author made an extensive study of reclamation of land in areas where strip-mining is being done. The findings of this investigation are published in "Report of Investigations 3440.*

Erosion begins soon after the land has been turned over, resulting in the formation of soil, and in many areas there is natural restoration of the land. This process of restoration is slow, but land that had been considered too poor for agricultural purposes before stripping that was done 20 years ago is now covered with a heavy growth of grass and timber. Some original soils will not support a heavy growth of certain grasses that will thrive luxuriantly in soil derived from lime-bearing shales and other rocks turned up by stripping. Erosion, weathering, and natural vegetation usually will make stripped lands useful for grazing, recreational areas, forest

(*Continued on page* 50)



35-cubic yard electric shovel

* Toenges, Albert L., Reclamation of Stripped Coal Land; Bureau of Mines; Report of Investigation 3440, 1939, 11 pp.

WHY DID THEY DIE?

IN THE year 1940 in bituminous coal mines of this country six explosions occurred, classed as major disasters since five or more men were killed in each. A total of 275 men lost their lives in these disasters.

These major explosions draw an undue amount of public attention, and distract notice from the conscientious and thorough work performed through the years by all safety agencies, but it cannot be denied that the number and severity has been out of all proportion to previous years and that vigorous remedial action must be taken to prevent a recurrence.

This unfortunate chronicle marks a break in a record which on the whole has been getting progressively better year by year. From 1936 to 1940, inclusive, the fatalities per million tons produced, from all causes other than major explosions, declined with minor reversals, from 2.97 in 1926, to 2.02 in 1940. In the case of major explosions underground the fatality rate, per million tons produced, declined from .59 in 1926, to .08 in 1939. In 1939 deaths from major explosions were only 3.4 percent of the total underground fatalities. For the first 11 months of 1940, the deaths from major explosions jumped to 26 percent of the total.

The record of progress in safety is not contradicted by the disasters of 1940. Years of patient, persistent effort and watchfulness on the part of all had borne fruit in the reduction of accidents, and in 1940 continued to bear fruit in all respects except that of multiple deaths from explosions. The Bureau of Mines was founded primarily to aid in the fight for safety by studying causes of accidents, to recommend safe procedure, and to assist in educating the industry from top to bottom in the ways of eliminating accidents. It was early recognized by the Bureau and by managements that the way to reduce fatalities was to have every man engaged in the industry aware of his responsibilities and steady in his determination to fulfill them. When the carelessness or heedlessness of one man, as in coal mines, can bring death to many others as well as himself, that responsibility is heavy. By education safety has been achieved and, in the long run, it can only be achieved in that way.

The specific causes of these six explosions may never be known, since an explosion usually destroys the evidence of its cause. But the possible circumstance or combination of circumstances which go to make an explosion are well known, and it can be said that every one of them was due to non-observance by someone of one or more of the principles of safety.

To those long experienced in mining these principles are an oft-told story. Yet it is only by repetition that deep and lasting impressions can be made—impressions so deep that action upon them becomes second nature. Safety education is not directed at a pool, it is directed at a moving stream.

FATALITY RATES IN UNDERGROUND BITUMINOUS COAL MINES IN THE UNITED STATES *

	Fatality rate per million tons due to major explosions	Fatality rate per million tons due to all other causes underground
1926	0.59	2.97
1927	.30	3.02
1928	.66	2.83
1929	.28	2.89
1930	.48	2.98
1931	.14	2.68
1932	.50	2.59
1933	.02	2.43
1934	.05	2.59
1935	.03	2.57
1936	.06	2.47
1937	.23	2.49
1938	.19	2.39
1939	.08	2.19
1940 (11 months)†	.71	2.02

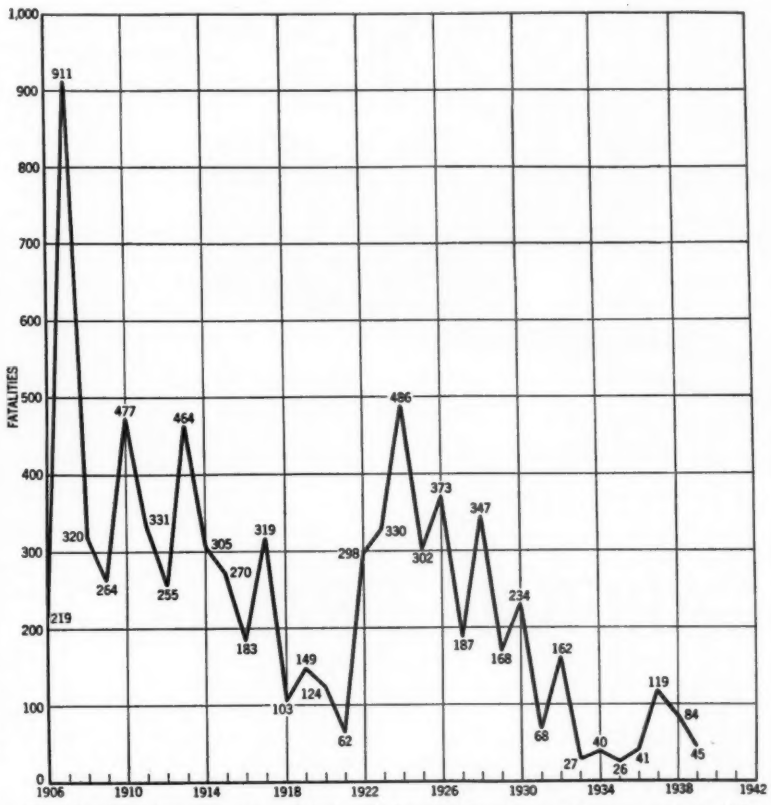
* Underground only; open-pit excluded.
† Figures subject to revision.

Those who have heard the story so often may forget that new generations are constantly coming along who must learn the lesson the same way—by repetition. And it is the duty of us all to see that it is learned in other ways than through the bitter experience which sends a group of men to oblivion.

In the sense that the possible causes of explosions are known, and the necessary preventive measures are also known, most mine disasters are caused by carelessness. It might be carelessness that the message of safety was not spread widely or persistently enough; it might be carelessness on the part of one or more individuals in observing the rules. It might also be callousness through long familiarity with the conditions—a state of mind that, because the same single acts have been performed without dire results many times before, perhaps in the same place, they can be done again—just this once —with impunity. That is the most dangerous state of mind of all.

The workman who takes a chance and loses his life as well as the lives of his co-workers has certainly failed in his responsibilities. But supervision and management were not free from blame when he took that chance.

The increased activity, opening up of old sections of mines, the more intensive working of properties and the economic pressure to produce at low cost have all had their share of attention as possible contributing factors to this bad explosion record for 1940. These are factors but only to the extent that they have resulted in a relaxation of vigilance to prevent fatalities and explosions. Smoking in a dangerous area was concluded to be the probable cause of one explosion. Many times in the past deaths have come from the same cause. That is only one illustration of the possible immediate causes of disaster, but it is symptomatic. Any man underground, if he is sly enough, heedless enough or determined enough, can at some time or other at least try to smoke in a gaseous area. In another case operation of permissible machinery in a nonpermissible condition was reported as the probable point of ignition of gas. These and many other cases are illustrative of the point that only through a deep consciousness of the risks run, and determination to eliminate them can safety come.



Total fatalities from gas and coal-dust explosions in bituminous coal mines, prior to 1940

What to do about it? One bad year does not make a trend. The bituminous coal mining industry, from miners to managements, from state inspection services to federal governmental agencies must see that it does not happen again. The means is at hand, a means that has been effective for many years and can be more effective in the future. That is education. Eliminate the risks? Certainly, by every method known to science. But above that must come a new determination to impress upon every man in the industry his responsibility to himself, his co-workers and posterity. There can be no relaxation of vigilance; the duty is never done. No one can know how many lives have been saved by proper precautions; we can only know how many have been lost through improper precautions. A lesson is before us; let us learn it thoroughly. The need to work safely must be even more forcibly impressed upon every man in the industry. The Bureau of Mines Safety Section is the chief means for accomplishing this. It must be fully supported.

In education lies safety.

EDITORIAL NOTE: THE MINING CONGRESS JOURNAL, *deeply conscious of its responsibilities to the mining industry, will carry out a definite editorial policy of devoting space each month to the furtherance of safety.* THE JOURNAL *will cooperate fully, to this end, with all agencies working for increased safety in mines—with the safety organizations of companies, of workmen, of industrial groups and of Federal and State departments. By this means it is hoped to aid the industry in achieving even better records than the best ones of past years. Timely and interesting data will be welcomed and considered for publication.*

New Circular Issued

Information Circular 7138 was recently issued by the Bureau of Mines with the title, "How Mine Workers Can Help to Prevent Mine Explosions." As the title suggests, the circular contains tips on measures that can be taken at the working places to insure safe operation.

Tunnel portal, and motorman coming out with a trip

CARLTON DRAINAGE TUNNEL

THE Golden Cycle Mill at Colorado Springs is almost wholly dependent upon Cripple Creek for its supply of ore. It was realized by the Golden Cycle Corporation that it was necessary to provide additional drainage in order that ground at greater depth than can now be worked profitably, could be developed and mined. For this reason this company decided to drive a drainage tunnel that would give the mines the desired drainage.

Financed Entirely by Private Capital

It is one of the few projects of its kind in this country today, financed entirely by private capital, in which a private corporation is taking a gambler's chance on developing and opening sufficient ore to pay for the cost of the work. It might be well to point out, at this time, the handicap placed on such an enterprise by the ever increasing tax load, resulting mainly from the so-called social legislation enacted in the past few years. Various taxes, such as, sales and use tax, old age pension, unemployment insurance and many others amount to nearly $2.00 per foot of tunnel.

Experience has shown that adequate drainage to facilitate mining operations will play an important part in the future development of the Cripple Creek District.

Tunnel to Assure Future Mining Development

The Carlton Drainage Tunnel, which will extend six miles through the massive granite surrounding the district, is, we believe, the solution of the drainage problem and will assure the development of mining there for many years to come.

This tunnel is the third drainage bore to be driven in the Cripple Creek area since it started producing telluride gold ores in 1891. For some time after mining began, no water was encountered, and it was believed that Cripple Creek was to be a "dry" camp. Credence was lent to the theory by the fact that the location was nearly 10,000 feet above sea level, with considerable lower-lying terrain close by to which ground water could gravitate. However, as subsequent geological examinations disclosed, the mineralized zone is the denuded crater of an extinct volcano. At the surface it constitutes an irregular area roughly 4 x 3 miles in size. The prevailing rock is breccia, characterized by angular fragments cemented together. It evidently was formed by recurring eruptions of lava each of which broke up partly solidified rock crusts from previous flows and rejoined them. This plug was intruded through a compact granite, locally termed Pikes Peak granite, which now surrounds it. Secondary volcanic activity continued for some time after large-scale eruptions ceased, with the result that dikes, flats and irregularly shaped masses of phonolite and latite were forced upward through the breccia and the adjoining granite.

All this internal churning broke up the crater rock to a considerable degree and left it more porous than the granite that envelops it. In a measure, it represents a gigantic sponge that has soaked up ground water for countless ages and occupies the neck, so to speak, of a granite bottle the sides of which are relatively impervious. The only way to drain out some of the accumulated water is to bore a hole through the granite incasement at a

By A. H. BEBEE
Vice President
Golden Cycle Corporation

Presented to Annual Metal Mining Convention, Western Division, The American Mining Congress, Colorado Springs, Colo., September 18, 1940.

level below the water surface, and that, substantially, is what is now being done for the third time.

Portal Elevation Almost 7,000 Feet

The portal of the Carlton Tunnel is located 8½ miles south of the towns of Cripple Creek and Victor, near the junction of Cripple Creek and Oil Creek. The portal elevation is 6,893 feet. Its course is N49° 54'E. The size of the tunnel, originally was 8½ feet by 9 feet but at present it is about 11 feet high by 10 feet wide, including a 4-ft. 6-in. radius-circle arch. The finished tunnel size depends on the type of ground encountered. The first 300 feet had to be supported. The main drive will be 32,000 feet in length to a position under No. 2 Portland Shaft, at an approximate elevation of 6,990 feet, or 1,120 feet below the present drainage level of that property. The grade will be +0.3 percent.

Merrill E. Shoup
President, Golden Cycle Corp.

To accomplish complete drainage for the Cresson and the Vindicator, two laterals will be driven from 4,000 to 5,000 feet each, from the Portland Mine. The approximate depth gained, below the lowest workings in the large mines is as follows:

Cresson	700 feet
Ajax	500 feet
Vindicator	1,000 feet
Portland	200 feet

Use of Bits

The first part of the tunnel was driven with conventional steel, with 3⅜-in. starting bits, 2-in. seconds, 1⅞-in. thirds, 1¾-in. fourths. Drill steel is 1¼-in. hollow round with standard lugged shanks. Detachable bits were soon substituted for several reasons, two of the most important being: First, the difficulty of properly handling the amount of steel necessary, with the equipment on hand, in the shop; second, the handling of the steel in and out of the tunnel. Between 900 and 1,300 bits are used every 24 hours. Both Timken and Ingersoll-Rand bits have been used with little difference in the cost per foot of tunnel. Hot milling was also tried with very poor results. It must be remembered that we have had extremely hard ground, and that for this reason our bit consumption has been very great.

A few months ago, bit sizes were reduced to 1¾-in. starters with a decrease of 1/16 inch for each change. A 9-ft. hole finishes at about 1 9/16 inches. This cuts down the drilling time per round as well as decreasing the steel and machine breakage. No difficulty has been experienced in breaking the ground with the smaller hole. It was assumed when the tunnel was started that it would be necessary to drill a fairly large hole in order to get a large amount of powder in the bottom to break the ground; but we have found that with careful tamping the ground breaks equally as good, as well as saving powder.

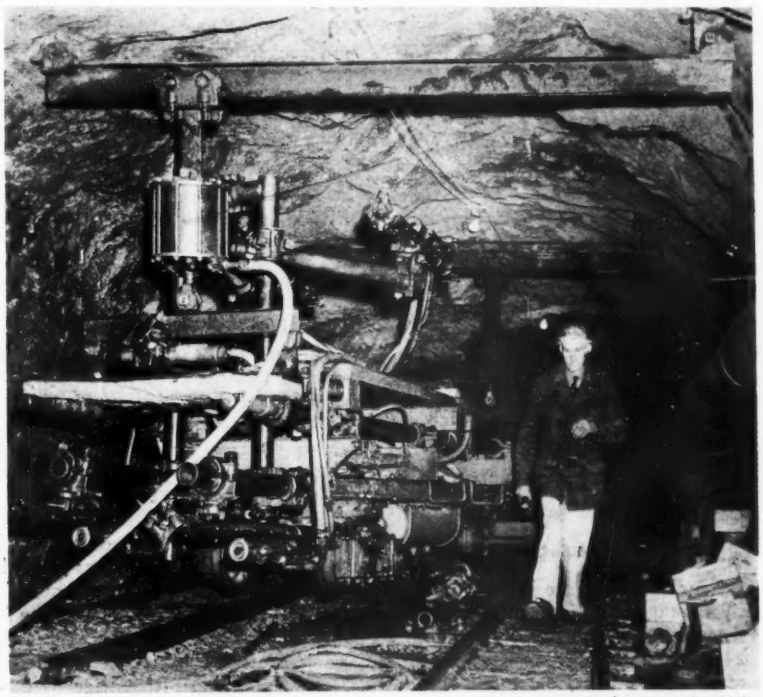
Drilling Methods and Equipment

Drilling is accomplished by five Ingersoll-Rand DA 35 Drifter drills equipped with power feed. These five machines are mounted on a drill jumbo. The jumbo, designed and built in the Cresson Shops, is 20 feet long and weighs about 5 tons without the machines and steel. Machines are not dismounted when the jumbo is moving. The vertical columns are left in position and the arms swing back parallel to the tunnel. Five minutes are required to get all machines running after the jumbo reaches the face. Additional machines may be mounted on the side of the jumbo for slabbing.

A jumbo crew consists of five machine men, four chucktenders, one steel nipper and a shift boss. Six or more complete rounds are fired every 24 hours. Rounds are blasted electrically by the locomotive battery, using No. 6X delay caps in 10 delays. The explosive used is a semi-gelatin of 60 percent strength. The machine men and chucktenders load the holes under the supervision of the shift boss in an average time of 15 minutes.

Use Cherry Picker Designed by Austin and Welch

An Eimco Model 21 loader is used, mucking into Granby type cars of 84 cubic-foot capacity. In August, 1940, the average loading time per car was 7.5 minutes. The cars are shifted behind the mucker by a Cherry Picker, designed by John Austin, the tunnel superintendent, and Robert Welch, master mechanic. It consists of a portable steel frame on skids, built with sufficient horizontal and vertical clearance to clear cars, motor, jumbo and all other equipment. A shaft is mounted on top and at each end of the frame work; two small drums are keyed to each of these shafts; on each



--COURTESY, EXPLOSIVES ENGINEER

Drill jumbo used in the tunnel

Cherry picker in action

--COURTESY EXPLOSIVES ENGINEER

drum a chain is wound with a hook on the end. Both shafts are rotated by a chain and sprocket drive, driven by a small air motor through a worm gear. When an empty car is to be raised from the string of cars, a hook is placed on each corner of the car frame, and the car is raised to a sufficient height to allow the passage of the motor and loaded cars. After a loaded car is pulled back from the loader an empty car is lowered to the track and pushed to the loader, another empty one is picked from the string of cars and the same cycle repeated.

This type of a Cherry Picker is more satisfactory than the old method of picking cars with an air cylinder and a crawl, then shifting them to the side, for three reasons: First, it is faster; second, it is not necessary to remove as much ground from the back for the new type picker, as it was when slabbing the walls for the older type; and third, by shooting the back, the loader can handle all the broken muck, while, by slabbing, a large amount of it had to be hand-mucked.

Haulage

Four 8-ton storage battery locomotives are used for haulage. Track consists of 40- and 45-lb. rails laid to a 24-in. gauge. For lengthening the track at the face, 6-ft. rail sections bolted to steel ties are laid as soon as mucking is completed. The rail sections are kept as close to the breast as possible.

Slide rails of modified channel sections are used when necessary. These rails fit over the top and down on each side of the regular rail. The 6-ft. rail sections are laid by part of the regular drill crew, as the loader is taken out and the jumbo is being brought in. No time is lost in track laying as the section is in place before the jumbo arrives at the face. As the face advances, five 6-ft. rail sections are replaced by 30 feet of regular track. Laying the final grade is done during drilling, so that no drilling or mucking time is lost.

Ventilation

The tunnel heading is ventilated by exhausting 5,000 cubic feet of air per minute through 18-in., 14 gauge, welded steel vent pipe. The pipe is welded into 40-ft. lengths and installed 40 feet at a time. Flanged joints with rubber gaskets eliminate leakage. A booster fan has been installed in the line at the 17,000-ft. point. The outside fan can be speeded up to give more capacity as needed. Vacuum now carried at the outside blower is 4 pounds. The vent line is carried to within 30 feet of the face and is protected by short lengths of screened pipe, against damage by flying rock. With the present system the heading is cleared of smoke in 10 to 15 minutes or while the power mucker is being brought up. There is no lost time in waiting for smoke to clear out and the main tunnel is at all times clear of powder smoke.

Compressed air for drilling and mucking is supplied to the face by 6-in. steel tubing, welded into 60-ft. lengths at the portal. One of these lengths is installed, using flanged joints, in less than 10 minutes, usually during the moving of the jumbo or mucker. The flanges are designed, forged and made at the Cresson mine shops. One 1,800 cubic foot and one 1,000-cu.-ft. compressor furnishes air for underground and surface use. Air pressure is 130 pounds at the compressors or about 125 pounds at the machines while running.

No serious water problem is anticipated before a point 25,000 feet from the portal has been reached.

A water ditch is carried on both sides of the track. This ditch is made by raising the track back of the face and slipping 4 x 6-in. plank under the edges of the ties. Muck from the sides is then shoveled into the center for track ballast.

The surface plant consists of an office, change room, fan house, compressor plant, blacksmith shop and powder magazine.

Cites Driving Gains

The average daily and total monthly footage is as follows:

Month	Daily	Monthly	Total advance
July	21.5	345	345
August	38.7	1,201	1,546
September	48.8	1,367	2,913
October	49.5	1,534	4,447
November	49.1	1,474	5,921
December	47.8	1,387	7,309
January	46.3	1,438	8,746
February	52.3	1,518	10,264
March	56.0	1,735	11,999
April	56.5	1,696	13,695
May	51.7	1,604	15,299
June	55.2	1,658	16,957
July	53.6	1,396	18,353
August	56.1	1,738	20,091

During August, 1940, 209 rounds were shot or an average of 6.73 rounds per 24 hours, pulling 8.32 feet per round.

The powder consumption was 28.6 pounds of 60 percent DuPont Gelex No. 1, per foot.

Average drilling time per round was 1 hour, 33 minutes and the average time per foot of tunnel was 11.7 minutes. Drilling time includes moving the jumbo to the heading, setting up, drilling, loading and shooting.

Average mucking time per round was 1 hour, 56 minutes and the aver-

age time per foot of tunnel was 13.9 minutes.

The greatest footage made in 24 hours was 78 feet, made on September 2, 1940, and 40 feet is the lowest that has been made since September 4, 1939. Four complete rounds have been shot and mucked in one 8-hour shift.

1,879 feet was made in 31 consecutive days.

The average for 402 days was 50 feet.

AVERAGE COSTS PER FOOT THROUGH JULY, 1940, ON A TOTAL OF 18,353 FEET

	Average cost per ft. on 18,353 ft.
Labor, except bonus	$10.689
Bonus	2.038
Power	1.650
Powder and caps	4.053
Detachable bits	1.048
Drill steel	.892
Pipe, ventilation, air and water	1.716
Track	.807
Drill machine maintenance	.703
Mucking machine maintenance	.449
Taxes	1.645
Depreciation based on 25,000 feet of tunnel	4.416
All other expense	1.500
	$31.606

THE FOLLOWING WAGE SCALE IS IN EFFECT

Machine men	$6.00
Helpers	5.00
Motormen	5.00
Nippers	5.00
Track men	4.75
Mucking machine operators	7.50
Outside labor	4.50

Shift bosses, machine men, helpers, nippers and muck operators share in bonus, according to the rate of pay. Bonus amounts to $4.00 per foot on every foot made over 900 feet per month.

Progress Due to Many Factors

The progress made on the tunnel to date is due to the following:

Excellent mechanized equipment, with spares for any piece that is apt to break down. The longest delay from equipment failure has been about twenty minutes.

The organization built up by the tunnel superintendent, John Austin, whose many years of experience in driving tunnels, is responsible for a well organized, satisfied and smooth working crew of men.

The system for handling track, air, water and ventilation lines, with absolutely no lost time in the heading.

The bonus system is building up the morale of the individual men and creating a spirit of rivalry between the different heading crews. The more footage made the more pay.

PUBLIC MINERAL LAND WITHDRAWALS*

By RICHARD L. NEUBERGER
Portland, Oreg.

THE conservation, development and most effective utilization of the mineral resources of our country is a topic known to me only in my capacity as a journalist. I have no specialized knowledge such as many of you people possess. In all the technical phases of the question, your familiarity with the problem far outweighs any information I might contribute. Whatever I may bring to this discussion stems primarily from the fact that, as more or less a disinterested observer, I can view the question from a detached perspective. I think—and hope—that I can see both sides of the problem. I shall attempt my best to present them here, and I trust they will form the basis for an interesting and beneficial discussion.

In 1934 the National Resources Board declared, "The central problem is the wise use of the national inheritance with regard not merely to the prosperity of the mining companies but the welfare of the army of mine workers and the long-time interest of the consuming public." The Board also pointed out: "Development of mines in excess of demand forces resource waste, capital loss and irregular employment, and among the major causes of over-development has been the lack of any clear picture of future requirements."

Controversy Over New Parks

These statements point up a controversy which since 1934 has become extremely acute in our country, especially in the Far West. This controversy involves the question of establishing great new national parks in wilderness areas. In recent years two vast parks have been formed. One is the Kings Canyon National Park in the high Sierras of California; the other is the Olympic National Park in the Olympic Peninsula in the State of Washington. These two parks aggregate in size considerably more than the entire territory of the State of Rhode Island. Throughout the West other areas are under consideration as national parks. Some of these areas are as vast as European nations over which bitter wars have been fought. Totaled together, they make an area immense in scope, rich in resources, and vast in magnitude. There are two sides to this dispute. It is my belief that these sides should somehow attempt to compromise their differences lest in the pending struggle both fail to realize their goals and objectives. One side wants to preserve and set apart the great scenic assets and beauties of our country. The other side wants to develop, use and exploit the resources which are available in these wilderness regions. I believe that both factions can attain their goals.

Several years ago the late Robert Marshall of the United States Forest Service wrote in the *New York Times:*

"Many balanced individuals desire to copy the values of both the past and present. Reasonable planning can make possible for man both the Twentieth Century and a primitive world, and there is no object or tolerance in demanding that one world should be all-encompassing, and that the other world should be wiped from the face of the earth."

Both Preservation of Scenic Beauties and Development of Mineral Resources are Possibilities

Mr. Marshall's sentiments are my sentiments. It is my opinion that in the Western part of our great land,

* Presented to Annual Metal Mining Convention, Western Division, The American Mining Congress, Colorado Springs, Colo., September 17, 1940.

we not only can preserve scenic and recreational features; we also can make possible the use and development of great treasure troves of mineral resources. We live today in a world in crisis. In our own country we are making a great effort to arm for the defense of America. We also are still engaged in an attempt to ameliorate the evils of unemployment.

Since 1933 the Federal Government has made a heroic effort to put men to work. Yet millions of people are still unemployed. In the face of all these conditions, it would seem to me foolish to remove arbitrarily from the economic sphere any resources which might achieve the dual aim of helping to defend the country and setting men at jobs.

Proposed Cascade National Park

For example, in the State of Washington it is now proposed to create a vast Cascade Mountains National Park —a national park that would be 4,760 square miles in area. This is as great as the State of Connecticut. The park, frequently alluded to as "the Polish Corridor," would practically cut Washington in half. What would happen to the mineral resources in that park? They would be removed from any expansive development. What about those mineral resources? The Washington State Planning Council has just made an extensive study of the Cascade Mountain Park area. Some conclusions of that study are significant.

The area which would be included in the park includes known deposits of silver, lead, copper, gold, and molybdenum. There are also probably deposits of chromite, mercury, tungsten, and manganese. Within the area, which is now largely covered by national forests administered by the United States Forest Service, are also 70,178 mineral claims. To close up this supply of minerals, summarily, is no light matter, especially at a time when the entire United States is taking inventory of the materials which can be used to create our weapons of defense. Here is one of the statements which the Planning Council made after completing its report:

"The natural resources of the Cascade Mountains should be developed further and managed on the multiple use principle, so as to provide in an orderly manner needed raw materials and recreational areas for the people of Washington and the nation. No additional lands of the Cascade Mountains should be converted into use as a national park. County, state, federal and private agencies should cooperate in making detailed and comprehensive survey of the minerals of the Cascades. Furthermore, prospecting and mining should be continued and encouraged. The West has progressed too far in the development of multiple use practice to return to the obsolete and single use principle, save in quite exceptional cases."

Olympic National Park's Creation Took in Valuable Manganese Deposits

From the Cascade Mountains, in the State of Washington, let us span the choppy waters of Puget Sound to the timbered Olympic Peninsula. In 1936 the Washington State Planning Council had this to say of the Olympic National Monument:

"Manganese is one of the so-called strategic metals essential to the ferro alloy industry and vital to national defense. Our present supplies are largely manufactured. Around the north, east and south borders of the Mt. Olympus National Monument, and for the most part outside the monument, are numerous great deposits of the ore of this most important metal. Geologists point out that the area has by no means been thoroughly explored as to mineral content, and it is quite possible that other minerals may exist. For this reason, your committee is of the opinion that the smaller snow peaks, areas lying east of the Mt. Olympus National Monument and the territory lying to the south thereof should not be included in a national park, but left to the administration of the Forest Service as recreation areas."

However, this advice from the Planning Council was utterly disregarded. The manganese deposits were included in the present borders of the Olympic National Park and are now fenced off from development. Please note that even as early as 1936, long before the present critical state of world affairs, the Planning Council saw the defense importance of manganese in our national life. I wonder if it is advisable for the country to permit the bottling up of valuable national resources without giving consideration to the economic convolutions which might result.

Federal Power Program May Make Possible Industrial Empire in the Northwest

At the present time the Federal Government is in the midst of a vast power development program in the West. This program centers at Grand Coulee and Bonneville on the Columbia River, Shasta Dam on the Sacramento River, and Boulder Dam on the Colorado River. On the Columbia River, especially, huge amounts of hydroelectricity, unprecedented in the history of mankind, are being generated. Some of this electricity will be used to light farms and homes, and pump water to irrigate thirsty acres. Large quantities of it, however, must be absorbed by new industries. President Roosevelt himself has suggested that the Western States might well become the location of many factories in our new national defense program.

How incongruous it would be for our government to develop enormous quantities of industrial electricity, on one hand, and on the other to withdraw from development mineral supplies which should properly be proccessed and completed by that power. On many occasions, Mr. Ivan Bloch, chief of the market development section of the Bonneville Power Administration, has pointed out that the new electrical developments on the Columbia River make possible a vast industrial empire in the Northwest. The Pacific Northwest, more than any other part of the country, is in need of such an empire. Let me explain why briefly. At the present time the region maintains its standard of living by its shipping its raw materials out to be processed elsewhere. It has an unfavorable balance of trade. It buys practically all its manufactured goods. The late Senator Borah once said that the West would never be as prosperous as it should be as long as it had to pay the freight both ways. Now, for the first time, there is a chance for the West in general and the Northwest in particular to become a center of certain manufacturing enterprises. Already in the vicinity of Bonneville Dam, several huge aluminum factories are in prospect.

I recognize the argument—that we must look out for the people of the future, that we must remember that these lands and scenic beauty are their heritage, that we must not use it up, but I also think of other things. We have additional values to preserve for those people of another day—those people who will come after us. We must preserve for them the essential liberties and privileges of American life. Perhaps the wise and proper use of our natural resources might help to do that. Let me explain what I mean. No country can forever continue the staggering load of unemployed people which weighs down our

nation. No country can exist in this world of 1940 without adequate defense. By this I do not mean that we we should become a militarized nation ruled by the army. God forbid that we should, but we must have adequate defense.

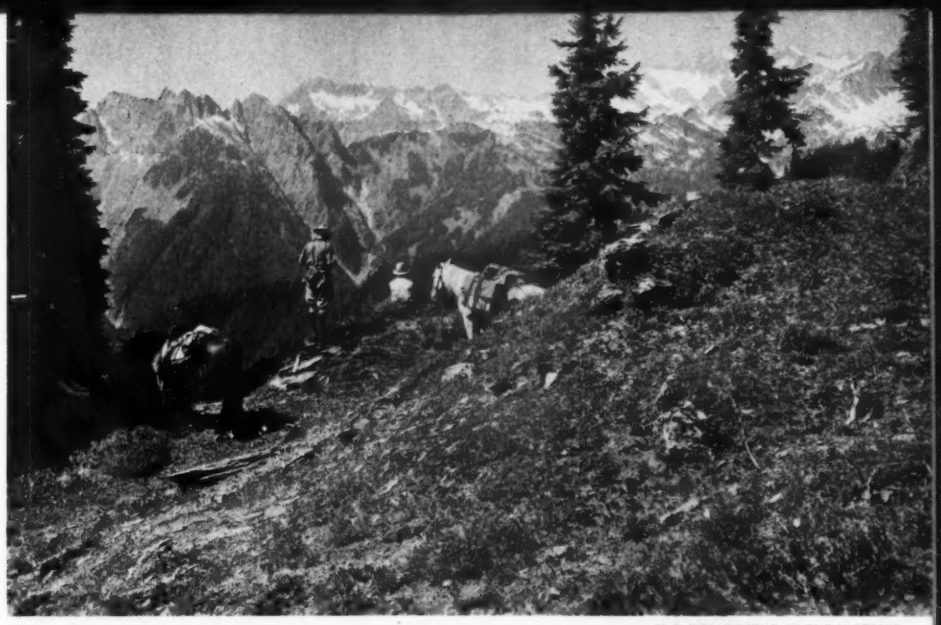
Mineral Resources of West Can Make Jobs

It is no exaggeration that the mineral resources in the vast hinterland areas of the Western States can put many people to work. Men must mine them. Men must transport them to market. Men must process them. Men must pass them on to the distributors and to the consumers. These minerals once manufactured into finished products also can be used for all the multitudinous weapons which are part of a modern defense program—warships, anti-aircraft guns, tanks, mechanized units and rifles. The Western part of the United States has confronted this problem for a long time. Particular areas confront it today in a very real and immediate fashion.

In the *Saturday Evening Post* for June 15 of this year I pointed out the case of Wallowa County in my own State of Oregon. Wallowa County forms the western wall of the magnificent Hell's Canyon, which the Snake River has carved between Oregon and Idaho. Should Hell's Canyon be made a national park, I do not think the men and women who live in Wallowa County would object to that one bit, but what if all the nearby area back from Hell's Canyon was also swept in the park, what about the prospecting claims and what about the livestock ranges and pastures? In recent years we have seen local recommendations completely passed over and ignored in the establishment of such national parks as the Olympic Park and the Kings Canyon Park. What reason have the people in Wallowa County to believe that this would not be the case of Hell's Canyon?

Advocates Compromise Between Conservationists and Developers of Natural Resources

It seems to me that somewhere along the line a valid and honest compromise can be reached by the advocates of complete conservation and the sponsors of the development of natural resources. I think this requires concessions and good will on both sides. I know of abuses which the owners of mineral claims have committed. In certain national forests in the Pacific Northwest mineral claims have been used as a camouflage, as hunters' camps and similar undertakings. Many men purport to have bona fide mineral claims and really put up places in the national forest where they fish and hunt and camp and make their homes. In some instances they even have set up regular establishments and sold gasoline, groceries, cigarettes and other commercial merchandise.



--U. S. DEPARTMENT OF THE INTERIOR

Pack outfit on the high divide between the north fork of the Quinault and the Queets. View is across the Queets Valley. Mount Tom and Mount Olympus in the distance

I am sure that the American Mining Congress does not approve of this deception and attempt to take advantage of the generous cooperation of the United States Forest Service. On the other hand, there have been instances where national parks have been proposed purely because of local and personal rivalries. Some men, anxious to extend their own jurisdiction, have been disposed to propose huge new parks, regardless of the scenic justification for such projects. These various abuses have resulted in an attitude and atmosphere of suspicion and rancor in which a reasonable solution of the problem has been impossible.

The United States is now engaged in an inventory of its resources. The government and the people want to know what is available in the way of land, water, minerals, timber, and other basic elements in our civilization. The nation now realizes that if we are to retain democracy, we must make a mighty effort not only to solve our problems here at home but to keep out of America the European disturbances which have destroyed most of the Old World. Any valuable resources will help in this. No part of America is any stronger than the Western part of America. The West is not going to be a strong, healthy part of America if vast quantities of its resources are shut off.

Large Increases in Population of Western States

The preliminary figures for the 1940 census show vast population increase in the West. For example, a number of middle western states, such as North Dakota, South Dakota, and Nebraska lost population in the decade since 1930. These states were trapped in the holocaust of the Dust Bowl. Thousands of their people had to migrate westward. This pilgrimation is revealed in the fact that California's population has increased 21 percent, Oregon's 14 percent, Idaho's 14 percent, and so on throughout the far West. Any resources which can be developed will put these people to work and help give them a chance to get a new start.

Suggests Forest Service Maintain Jurisdiction Over Frontier Areas

Now, let me say what I think should be the solution of this problem. I believe the United States Forest Service, with its multiple use program, has the welfare of our country at heart. The late F. A. Silcox, the chief forester, was one of the notable conservationists of our time. Under him, men who came to possess responsibility in the Forest Service realized that the West not only had to be conserved and protected but also developed and expanded. Many of the places in the West now proposed for national parks are not particularly dramatic scenic

attractions. They are heavy forests and majestic mountains, to be sure, but they are also places duplicated in many other parts of the country west of the Mississippi River. I suggest that these regions be continued under the supervision and sovereignty of the United States Forest Service. I have seen no glaring abuses by the Forest Service which would lead me to believe that that Government organization is incapable of controlling and managing the great Western wilderness.

Where there is a particular scenic item of unique beauty or grandeur, there might be justification for a new national park. By this I mean such a scenic example as Crater Lake, the Grand Canyon or Yosemite Falls, but the national park should not be so sprawling and so huge that it includes vast stretches of adjacent territory—territory which might be used for mining and other economically useful pursuits. Hell's Canyon, for example: the Canyon itself all the way up to the rims could be made into a national park. No important mineral deposits, no spacious range lands, no thick growth of timber would thus be withdrawn from production, but the park might be made so huge that it would defeat its own purpose by severely restricting the economic activities of the region. I urge a smaller park—a park which would conserve the essence of the scenery and at the same time not include the bulk of the resources. I think this should be the goal everywhere in the West.

Thorough study of this problem convinces me that, although there are many things to be said on both sides of the case, it would be wiser to continue the Forest Service as the controlling agency of our wilderness and frontier areas, rather than greatly broadening the jurisdiction of the national park bureau. It did not take me long to come to the conviction that many of the people who advocate vast new parks have not given due thought to our problems in the West. What would men and women in the South say if a proposal should be made to remove vast cotton planatations from any economic use? What would men and women in New York City say about a scheme to take 30 or 40 square blocks of New York real estate and jerk it out of use for building sites and other undertakings?

Mineral Lands Should Be Open to Sound Development

The life blood of the West is its water, land, minerals, timber and agricultural resources. Mineral resources range high in importance, and as Bonneville, Boulder and Coulee power becomes more of a factor, that importance will increase. We must also remember that science has only tapped the many uses to which minerals can be put. Although war is a dreadful and shocking example to us, how much more important are materials and minerals in this war than in the dreadful conflict of 1914-18? So I believe that, unless there are imperative and exacting reasons not yet brought to light, the mineral lands of the Far West should be open to sound and prudent development. By this I do not mean any of the old timber land "cut-out and get-out" methods. Mineral deposits should not be gutted and exhausted. They should be developed on a long-time basis and made to provide the maximum yield compatible with steady employment and use.

In recent months such groups as the Pacific Northwest Regional Planning Commission and the Washington Planning Council have made it plain that conservation does not necessarily imply the complete bottling-up of rich natural resources. Miners, stockmen, lumbermen, timber workers' unions and farmers have voiced similar opinions. Illustrious statesmen have joined this chorus. Among the United States Senators protesting a transfer of the Forest Service from its present jurisdiction and doctrines are such figures as George W. Norris, Charles L. McNary, Burton K. Wheeler and Worth Clark.

These attitudes have brought results. Secretary Ickes several weeks ago addressed a significant letter to R. H. Rutledge, Federal administrator of the Taylor Grazing Act. Here is a portion of that letter: "I wish to state frankly that, as a result of this department's studies, I am not considering national park status for any area in the Cascade Range. I am convinced, however, that there are limited areas of outstanding scenic and recreation caliber in the Cascades that should be established as national recreational areas, *in which prospecting and mining, water conservation projects, grazing, and hunting should be permitted.* . . . Establishment of national recreational areas will liberate these outstanding resources for their most profitable development without excluding other uses."

Let us hope this presages a tapering off in the campaign to establish national parks which have boundaries that go beyond all rhyme or reason. We also must hope that glorifying and protection of natural grandeur will no longer mean that rivers are not available for irrigation and power, forests for lumber, meadows and hillsides for grazing, and mineral pockets for the myriad metallic products of modern society. There is no valid reason why a prospecting claim at the base of a great mountain peak should entirely exclude that peak from classification as a citadel of recreation and scenic majesty.

We who live in this troubled age have a mighty responsibility. One of those responsibilities is to make democracy work. I believe that democracy can be helpful to work in the West if we use our resources to keep people

U. S. DEPARTMENT OF THE INTERIOR

White River checking station, Mt. Rainier National Park

at work and to provide useful things. With that in mind, I am an advocate of using our frontier, both for recreation and for economic development, and I do not think that one need by any means exclude the other. There is a new organization in Washington, D. C., called "Friends of the Land." Its moving spirit is Russell Lord of the Department of Agriculture. I am glad to see that in the prospectus of this organization there is not only a desire to conserve our natural resources but also a desire to foster the sound "investigation, exploration, reserve experimentation and use" of our resources. Ben H. Kizer has often said the conservation which merely shuts off resources is not real conservation.

Genuine conservation is that conservation which not only protects the enduring qualities of our outdoors but also permits the development of its valuable qualities. Both of these may be hard to accept simultaneously, but accept them we must if we are to attain the best which is in our civilization. The people who want complete conservation and the people who want complete development both have good talking points and worthwhile arguments. If we blend those arguments in a forward-looking program, I am sure they will be the best thing for our country. There may be some flaws and mistakes in the Forest Service's ideas of multiple use. Yet, I think there are less flaws in that program than in any program which acts to set aside huge areas restricted only to a single use.

A long time ago when he sent Lewis and Clark westward on their great journey into the unknown, Thomas Jefferson said he visioned "a great free and independent empire" in the West. He was a man who believed in the development of an economy in the hinterlands which took care of all the people. I am sure that his dream would best be realized by allowing our natural resources to be used. You who are vitally interested in mining and mineral development can do your part by adopting standards and methods which will not encroach on the natural beauty of any regions which are tapped for their mineral wealth. With that cooperation, I am sure the miners and the mining interests of America will be doing their part in our program to make democracy work at home and to protect it against anti-democratic forces from abroad.

— *Discussion* —

H. L. FAULKNER
Attorney
Juneau, Alaska

VICTOR J. HAYEK
Mining Lawyer of Los Angeles, Calif.,
and
Secretary of the Mining Association
of the Southwest

WHAT I shall have to say on this subject may not appear to be directly in point, but so far as Alaska is concerned, the policies of the Department of the Interior, as at present constituted, affect alike both mineral and nonmineral lands and acquisition of title therto.

Fishing and Mining Principal Alaskan Industries

There are only two industries in Alaska, namely, fishing and mining. They are of equal importance, although the value of the total yearly production from fisheries exceeds that from the mines. It is, of course, necessary in the development of a mine or the establishment of any kind of fish processing plant that title be acquired to certain lands. In the case of a mine it is necessary to obtain patent to the mineral claims and millsites and other lands necessary to successful and convenient operation. In the case of the fisheries, it is necessary to have canneries, warehouses, cold storage plants, etc.

Cites Interior Department Policy Towards Public Lands in Alaska

So far as Alaska is concerned, the problems attending the acquisition of title to mining claims and millsites are so closely akin to those encountered in the acquisition of title to nonmineral ground, that a broad general discussion of the whole policy of the department toward public lands in Alaska might be of interest.

H. L. Faulkner

Alaska comprises an area of approximately 600,000 square miles. A little over one-half of 1 percent of this area is at present privately owned. The remainder is either a part of the public domain or in reservations.

Of the vast areas in reservations—probably one-fifth of the total—many portions such as Annette Island Reserve, which is set aside for the exclusive use of one tribe of Indians, the large military and naval reserves and the public parks are not open to private occupancy in any form. Other vast areas such as the great national forests are subject to only limited use under the permit system, although forest reserves are open to prospecting and mining and title to mineral ground found therein may be acquired in the same manner as if found on the public domain. The granting of patents, however, to lands in the forest reserves is done under the same laws and the same rules and regulations as are applicable outside the forest reserves.

The forest reserves of Alaska have always been wisely administered. No obstacles are placed in the way of prospectors and no efforts have ever been made to prevent the acquisition of patents to mineral ground in the forest reserves. They contain large areas of timber which some day may be used for paper manufacturing. When nonmineral lands are required in the forest reserves for cannery sites, dock sites and for the purpose of trade and manufacture or for any other private purpose aside from mining, the procedure is to have the tract needed eliminated from the forest reserve and thrown into the public domain, so that title is obtained to these nonmineral lands under the methods prescribed by existing laws.

Charges Alaska Used for Experiments

I think I am safe in saying that the overwhelming majority of the people who live and have property in Alaska are satisfied with the present administration of the forest reserves, but when it comes to the administration of the public domain outside the forest reserves, and when it is necessary to acquire title to any portion of this public domain for any legitimate purpose, great difficulties are encountered. The policy of the present Secretary of the Interior is to use Alaska for experimental purposes and to experiment there with things which have been tried before and which common experience has demonstrated to be impractical. To this end the Secretary is very much in favor of a change in the mining law.

First, we are witnessing each year additional withdrawals of the public domain into reservations such as vast national parks in regions seldom visited by human beings and which will never have any value unless it would be through the discovery of minerals. As an instance of this, I cite the Glacier National Park in Southeastern Alaska in which there is set aside and reserved approximately two million acres, where prospecting may be carried on only under restrictive regulations of the Department. The Secretary is contemplating reservations of large areas in Southeastern and Southwestern Alaska to be set aside to conduct experiments on behalf of the Indians in canning salmon, at public expense and under government supervision, although it is conceded by all government officials, including the Secretary himself, that salmon canning in Alaska will admit of no further expansion. This would mean, of course, that the establishment of any new enterprises by the government for the Indians would necessarily be at the expense of private industry already established.

Second, the Secretary is in favor of the substitution of a leasing system of mineral lands for the present law, so that no further title could be acquired to mineral lands in Alaska, but they would be leased on a royalty basis.

Soldier's Additional Homestead Applications

To illustrate the policy of the present Secretary in the matter of the acquisition of title to lands in Alaska, I should like to state briefly his attitude toward Soldier's Additional Homestead applications. The provisions of the revised statutes, as most of you know, gave certain homestead rights to soldiers and sailors who served in the Civil War. These were extended to include other wars. A soldier or sailor who was honorably discharged was entitled under certain liberal regulations to acquire 160 acres of public domain. If he acquired a tract of land which was less than 160 acres, he received what was known as an additional right, or the right to acquire an additional number of acres representing the difference between what he had acquired and 160 acres. This right was evidenced by scrip, and the scrip has been held to be property which could be sold, transferred and assigned. This scrip, when acquired by any citizen or corporation, may be used to acquire title to public domain. The scrip is bought and sold and transferred quite freely. If a person has a piece of Soldier's Additional Homestead scrip representing, say, 40 acres, he may automatically use that as a basis for the acquisition of 40 acres of public domain anywhere. Most of the non-mineral lands, aside from townsites in Alaska, have been acquired either by means of scrip locations or as trade and manufacturing sites. Practically all cannery sites, wharves, warehouse sites, dock sites, fisheries plants and manufacturing plants, and some property used for mining purposes where it was not practicable to have a millsite, have been acquired by means of scrip locations.

Most of these sites, of course, are on the coast in Southeastern and Southwestern Alaska. Now the law made provision for a reservation for a length of 80 rods along every navigable stream or body of water adjoining each patented tract. In other words, when you acquired a cannery site or a trade and manufacturing site on navigable waters—and that is where they are all situated—and you obtain patent to your site, the adjoining site for a distance of 80 rods along the water was reserved, and neither you nor anyone else could obtain patent to that tract prior to June 5, 1920. This reservation of the 80-rod strip worked a great hardship on many persons engaged in business who required a little additional land along the shore. After much effort, the law was changed, and on June 5, 1920, Congress provided that this 80-rod reservation might, on application to the Secretary of the Interior, in his discretion, be restored to entry and patented in the same manner as any other trade and manufacturing site or Soldier's Additional Homestead claim. From June 5, 1920, until about two or three years ago all such tracts had been automatically restored to entry by each Secretary of the Interior without any question whenever application was made. However, two or three years ago the present Secretary adopted the policy of refusing to make any further restorations of these 80-rod strips. In other words, he has refused to exercise his discretion, and his avowed policy is to hold all such tracts in the public domain the same as they were prior to the passage of the Act of June 5, 1920.

Applications for Patents to Mineral Lands Held Years Without Action

Furthermore, the present Secretary has for some unannounced reason held in Washington, without action, applications for patent to mineral lands which have been pending for upwards of three years. In one instance, applications were made for a group of claims upon which more than a million dollars worth of work and development had been done, where actual mining had been carried on and where everything was in order, surveys made, applications filed, notices published and proofs furnished. In another instance applications were made for patent to a group of mining claims adjoining an operating property upon which the owners are expending large sums for development. In this case also hundreds of thousands of dollars have been expended in development work, surveys made, applications filed in order and all the regulations of the Land Office have been complied with. All these applications are being held in Washington without any action, without any explanation and without reason.

The de Rouen Bill

Recently the Secretary of the Interior caused to be introduced in the House of Representatives H. R. 8732, which was brought forward by Mr. de Rouen, chairman of the Committee on Public Lands, by request. This bill purports to be one "to promote the development of the Territory of Alaska, etc.," and it withdraws from location and entry all public lands in the Territory of Alaska within 80 rods of any water. In the Territory with its 25,000 miles of coastline, where most of the settlements and industries are on tidewater, with its vast system of rivers and streams, its millions of lakes, it is difficult to find any land of any description which is not within 80 rods of some water. The bill provides that such land shall not be subject to settlement, location, sale, entry, lease or other form of appropriation or use until the lands have been classified by

the Secretary for such appropriation or use, and that the Secretary may prescribe the terms and conditions upon which permits, leases and renewals shall be made, and that no lease shall run for more than 20 years. The Secretary is given full power to promulgate all such regulations as he deems necessary.

Even if the leasing system were desirable, under such a bill the provision that no such lands shall be used for any purpose until they are first classified by the Secretary would stifle all further settlement and development in the Territory.

I should like to give you an illustration of what treatment might be accorded to one who would seek to use a tract of land in the Territory after this bill became law. Some years ago Congress enacted a law which provided that Indian possessions in Indian villages could be sold, mortgaged or transferred only upon the approval of the Department of the Interior. An Indian named Shorty Johnson died in the Village of Angoon. He had a family house which was built a few years before he died. He left as his heirs three grown daughters and a son, all over the age of 40 years. His estate was administered and the home property in Angoon was decreed to be the property of the three daughters and the son in undivided equal shares. The Board of National Missions of the Presbyterian Church desired to purchase the house and to make it over into a mission house, in connection with its mission work in the village. The heirs of Shorty Johnson were all in need of money and were very anxious to sell. The purchase price was agreed on at $1,350. The heirs all signed a deed to the Board. The Board sent a check to our office on February 4, 1939. The deed was then forwarded to the Land Office at Anchorage, Alaska, for approval. The Register promptly approved it. The Chief of Public Surveys approved it. The head of the Bureau of Indian Affairs in Alaska approved it. The Indians needed the money; two of them were receiving assistance from the government through the Bureau of Indian Affairs. There was no way in which they could use the property for they held it in common, and, under the laws of the Territory in such cases, the property would have to be sold and the proceeds divided before the heirs could benefit. None of the heirs occupied the property. The deed was then forwarded to Washington for the approval of the Secretary, and there it remained without action for many months. In the meantime some of the heirs and their families were on relief. The check was in our safe. After much writing and inquiry on behalf of the Board and on behalf of some of the local officials, at the expiration of almost a year, we received word that the Secretary would approve the transfer of the property only provided a clause were inserted in the deed that if the Board ceased to use the property for church purposes, it would revert to the Indians. The Board was contemplating the expenditure of several thousand dollars on the property in order to make use of it; and, of course, it would agree to no such restriction in the deed. After the Board had of necessity declined the Secretary's conditions and pointed out to him that they could not expend the Board's funds, which were in the nature of a trust, in the same manner as the Secretary and so many others in high authority so lavishly expend public funds, no further word was received from the Department. Many more months passed, and finally in July 1940 an alternative proposal was presented to the Board that there be inserted in the deed a condition that if the property ceased to be used for church purposes at any time in the future, the Board must post notices for one year offering the property for sale to the government at cost, plus the value of the improvements. In other words, if the church should be forced to abandon its mission work at Angoon, its property must be tied up for a period of a year before it can be disposed of or used for any other purpose. In the meantime, the check representing the purchase price had been held for 18 months during which period one of the heirs and her seven small children were living on relief.

Eternal vigilance is the role which must be played by all those who own anything in Alaska or contemplate acquiring anything. Such bills as the de Rouen bill for the withdrawal from entry, occupation and use of all lands within ~~80 rods~~ of any water, the Alaska colonization bill, which would dump into the Territory thousands, or, if the Secretary had his way, perhaps millions of helpless refugees, to become a charge on the country, and the proposal for leasing of mineral grounds, must be constantly watched and opposed. The Secretary in a statement made public last fall referred to those of us who live in the Territory and have any interests there and who are alive to the dangers apparent on the face of his schemes and proposals, as a group of monopolists attempting to preserve their monopoly, which, according to him, must exist through our ownership of one-half of 1 percent of the lands of the Territory.

THE United States is today confronted with momentous problems that demand quick decisions and action. Our internal economic and industrial structure, under stress of powerful influences, is undergoing revolutionary changes. American relations with foreign powers are such that mere watchfulness is no longer adequate. The order of the day is marked with frantic efforts to marshal our national resources in an endeavor to set up an adequate national defense front.

We are already, however, acutely aware of bottlenecks in production. And one of the most dangerous shortages, a bottleneck that threatens to disrupt the entire framework of defense plans, is the dearth of strategic and critical raw materials.

A truly thorough and successful national defense program must envison this country as a producer of its own strategic and critical raw materials. We must be prepared, in the event foreign sources of supply are closed to us, to produce all essential war materials.

Victor J. Hayek

Where in our land are we to find these vital raw materials? We know that certain of these critical elements are to be found in our Western States. We also know that under normal conditions it would perhaps not be presently commercially profitable to mine and extract them. But we are not living in normal times today—we are face to face with an emergency. We must utilize all our latent resources in a unified effort to mobilize our all for the defense program. To this end everything possible must be done to encourage the discovery, development and production of those strategic and critical materials essential to sustain

(*Continued on page* 50)

Butte has with just pride been called "The Richest Hill on Earth"

MINING GEOLOGY TODAY and TOMORROW

By RENO H. SALES
Chief Geologist
Anaconda Copper Mining Company

I HAVE read with much interest Mr. Joralemon's paper entitled "Mining Geology Today," presented at the Colorado Springs meeting of the American Mining Congress. I am happy to be afforded the privilege of discussing certain features of it, and I shall take advantage of the opportunity to call attention to what I consider important phases of the subject not touched upon by the author. Although I find myself in general agreement with the substance of the paper, there are many statements which do not seem to harmonize with my own field experience.

Primarily in our consideration of the subject of mining geology, we should assume that we are dealing with trained men and geologists competent to exercise proper judgment in passing on the common types of geological problems confronting the prospector, small mine operator or the client. Under such reasonable assumption many of the difficulties cited by Joralemon disappear automatically. For example, there can be no excuse for a geologist spending months, or even weeks, on the job of mapping a small mine or prospect. A competent geologist does not make expensive laboratory studies covering phenomena unrelated to the problem in hand. But, I might add, even the experienced geologist should not permit himself to pass final judgment on matters of geology vital to his problem without adequate mapping and study of the geological facts available at the surface and in accessible mine workings.

Editor's Note: Mr. Joralemon's paper which is discussed by Mr. Sales appeared in the December, 1940, issue of MINING CONGRESS JOURNAL.

Urges Geology Be Built on Facts

Always there will arise the question as to what constitutes adequate mapping. It is undoubtedly true that the experienced geologist will be expected to more quickly form his opinion, but even he should not do a hurry up, half job, of mapping against time in order that he free himself to run to other prospects and mines, with assurances to his client that, allied with Lady Luck, he will meet up with a good one sometime, somewhere, somehow. Actually, good judgment dictates to him which properties are worthy of careful study and which are not, and he should act accordingly. I am firm in my belief that the geologist should build up geology, geological theory, and geological opinion, on facts, and not on hastily conceived notions, or on hunches.

Cautions Against Haste in Mine Examinations

In fact, throughout Joralemon's paper there runs the suggestion of hurry and haste. "Haste becomes a virtue," he says, "and in most cases decision must be adverse before geology starts," and further, "there is seldom need for anything save a very hasty and casual geological mapping." Worst of all we are told, "where the preliminary view shows that geology will play an important part in an examination, detailed work must be looked upon with suspicion," and later, "too detailed a study of phenomena that will probably prove not to be related to ore deposition will not only waste time, but often will give a wrong idea as to the occurrence." This is laying it on pretty thick to the discomfiture of the mining geologist. Here the value of careful geological work in connection with mine examination work is severely depreciated, and Joralemon does it on the assumption that the examining geologist is not competent to appraise the importance of the respective geological factors involved. Otherwise, be he competent, no part of his work will be looked on with suspicion, or will he waste time on geology unrelated to the problem in hand.

Mr. Joralemon injects a peculiar bit of reasoning in stating that when a small mine hires a geologist who spends "many months in a detailed survey of the mine and district, the ore found is likely not to pay for the finding," and on a later page he adds, and I quote:

"In making decisions based on the examinations of a day or two that are all the smaller companies can afford, the geologist runs a risk of missing some hidden factor that might profoundly influence his conclusions. Occasional ore bodies may escape him, or he may spend too much money to find ore. He may even cause the mine to shut down when a more detailed study might find profitable ore. This is a risk that he and his clients must run. If he has had a fair amount of experience, added to the intuition that no amount of detailed drudgery can entirely replace, the chance of making such mistakes is slight."

From which reasoning one must conclude that the geologist who does careful detailed mapping, or the "detailed drudgery" of an examination, finds only non-commercial ore, whereas the experinced man acting hastily with "intuition" and "chance" as "allies," plops into the big and valuable ones. Here again is unwarranted depreciation of the value of careful geological mapping, and applause for the "stop and run" school. But Joralemon reverses himself and supplies a partial answer when he says, "the most insignificant detail of today may lead to an entirely new outlook in a great district tomorrow." We might well ask, could not this be just as true, even more so, when we are dealing with prospects or small mines where every scrap of evidence is needed to enable the geologist to form intelligent conclusions? I think Joralemon will agree that the less the information in hand, the greater the difficulty in arriving at an opinion. Which, I repeat, does not mean wasting time on non-essentials.

Day of Simple and Easy Discovery of Mines Is Past

It is not exactly clear why the author suggests that the present day mining geologist should adopt some of the methods used by early day prospectors and mining scouts, to whom is credited, and rightly so, centuries of success in finding mines. I am certain no one realizes better than Joralemon that the day of the simple and easy discovery of mines has passed. There are no rich veins or deposits sticking out of the ground ready to be found by merely chipping off a sample or digging a 10-ft. hole. Geological gambles, so-called, are now the order of the day. How far would the early day prospector get today pawing over what now remains for our consideration? How many new mines are currently being found by the prospector of today who not only uses the methods of the early prospector, but in addition has the advantage of much published geological and mine information covering most of the country? Any mining man can supply the answer.

Concerning other phases of the subject of mining geology, I desire at the outset to distinguish between mining geology as it relates to the appraisal of prospects, large or small mines, to ore extensions, and to ore possibilities; and mining geology, or applied geology, as employed in going mines to aid the operation. In the former we are concerned chiefly with our ability to see "into the ground," or beyond the working face; while in the latter we have to deal with developed or partially developed ore bodies, but which offer headaches and troubles to the operator through faulting, branching, pinches, impoverishments, or other unexpected structural peculiarities. Both involve the value and productivity of individual mines and district, and in final accounting, the life of our mining industry.

Aid to Mine Operator and Prospector and Advancement as Science, Aims of Geologists

Mr. Joralemon's paper discusses more particularly the relation between the prospector, small mine operator, and the geologist, although he calls attention to mining geology as practiced by larger companies. He states that the main aim of mining geology is to find ore at a not excessive cost measured by the value of ore found. But success in this field will depend in some considerable measure upon existing knowledge of the geology of ore deposits and their probable origin coupled with the ability of the observer to map accurately, and interpret correctly, the geology of the deposit under consideration. It necessarily follows that one of the primary aims of mining geologists should be to advance the science of ore deposits in order to make more effective the search for ore. Summarizing then, the chief aims of mining geology are, (1) to be of assistance to the prospector, to mine operations large or small, and (2) to advance the science of ore deposits.

As to the first objective, I will go no further here than to pledge for myself and co-workers that with the help and cooperation of the operators, the mining geologist will continue to improve technique and methods in every way possible to help management do a good job of mining. Modern and successful use of geology in mine operations has been described in so many publications that repetition seems out of place here.

Now, as to the second objective, that of advancing the science of ore deposits. Many mine operators may wonder where their interest or concern is in an objective seemingly so far from their immediate thoughts and worries. I am going to tell where they come into this picture. Incidentally, keep constantly in mind that the management thinks geology every time a drift or crosscut is run on a new level, or a study is made of ore reserve setups of developed and probable ore, and sometimes there is concern over that immeasurable "possible" ore. Then and there are formulated reasons, usually theories of ore deposition, to guide future operations.

No one will deny that the mine management has an obligation to the owner of the mine to do everything within reason to extend the life of the property to the greatest length possible by extracting all the commercial ore the property contains. Also, there is an obligation to the people of this nation to conserve and not waste metal resources which means the maintenance of reserves through the discovery of new ore to replace that used up. To discharge these obligations as far as the element of geology comes into the picture, I desire to make some suggestions to operators.

Suggestions for Operators

Employ competent geologists to map and study the geology of the mine to help the operation, and to preserve geological records for possible future use in the mine, and for the benefit of geological science. Neither mining geology nor the science of ore deposits have sufficiently advanced to give always the final answer to that important question as to when a mineral deposit is exhausted. We need all the information brought to light by mine openings to assist in the solution of this and other problems.

We have before us today many examples where large and important deposits of valuable metals are being mined without provision being made for adequate geological records, and where little or no contribution is being made to the science through careful geological study. Large, low-grade deposits of the so-called porphyry type are often thought of as a strictly measurable resource of limited vertical extent. Where there is much smoke, there may be fire, and who can

say that disseminated deposits, or intensely fissured areas showing only low-grade mineralization, are not merely the smoke of important associated ore concentrations?

Cites Examples in Support of Need for Careful Geological Studies

Let us pause to consider a few examples. Had the Butte central copper area been covered by the 500 to 1,000 feet of the extrusive rhyolite which spreads out over the northwestern part of the district, the picture there today might have been one of worked out, abandoned silver-lead-zinc mines such as the Bluebird, Nettie, Alice and Black Rock, with the presence of valuable copper ores unsuspected. A similar situation would have existed had there been 1,000 to 1,500 feet less erosion of the upper portions of the copper veins. When the first prospector arrived, he would have found only silver-lead-zinc ore above the copper area, and perhaps worthless outcrops above the Rainbow and other silver-lead-zinc veins.

In the Southwest, if Bisbee gulch and the original small Copper Queen outcrop had been hidden under a covering of Gila conglomerate or other deposit of relatively recent origin, leaving only the Sacramento Hill with its leached outcropping visible to the early prospector in that immediate area, one could readily visualize the Bisbee camp today as an abandoned porphyry ore pit with but little positive evidence indicating the existence of the tremendous high grade copper ore deposits which have made that district famous. In Utah, only slightly less erosion of rhyolite would have kept in reserve the important Tintic Standard and North Lily ore bodies, and in the Black Hills, S. Dak., erosion may have played a friendly role by removing enough Cambrian rocks to bring to light the outcrop of the famous Homestake ore body.

In the case of porphyry or other developed ore bodies, it may be that little or no geological mapping is needed to aid the day to day operation. But what of the day of reckoning when the end is near? Could there be a better place to explore for new or additional ore than one with existing up-to-date mine and metallurgical plants, and with established homes and communities depending upon the continuance of the enterprise? And could there be a sadder story for the management than a last minute discovery of evidence that valuable ore concentrations might exist in the immediate vicinity, only to find no record of pertinent geological facts upon which to build a proper prospecting program? Large sums are spent in metallurgical research to save pennies per ton in costs, or the last ounce of metal in recoveries, but little or nothing to make as certain as possible that millions in ore reserve are not being overlooked.

Considerations Necessary for Industry's Preservation

I can assure mine operators that these words are not being written to sell jobs to mining geologists. There are considerations and objectives involved of infinitely greater importance, namely, the preservation of our mining industry and the conservation of our fast-disappearing natural resources. We, who have labored over these problems of ore bodies and ore extensions are perhaps better aware of what the present limitations in our field of mining geology are than are those who mine ore. I, for one, am not a defeatist. I am certain that much progress will be made in mining geology provided there is helpful cooperation between industry and those engaged in the study of ore deposits, whether mining geologists, geological departments in universities, or the United States Geological Survey.

Urges Strengthening and Expansion of U. S. Geological Survey

I have mentioned one way for the mining industry to help in the accomplishment of these objectives. I shall here call attention briefly to another which involves the relation between the mining industry and government with respect to natural resources. We hear reassuring words from high places about the development of our so-called unlimited natural resources, but very little about the rapid rate at which they are being exhausted, or what should be done to find new ones to replace those nearing exhaustion. Every mining man who was present at the Congress meeting is aware of the truth, just as he is aware of the fact that past Congressional support of the United States Geological Survey has been wholly inadequate and niggardly. The depletion of our natural resources, including strategic minerals, does not coincide merely with emergency. It goes on and on, but it seems we think seriously only in times of emergency. During such periods we attempt to cover the country with field men, many of them wholly inexperienced, to catalogue and appraise our undeveloped resources. Such a course, attempted in the early thirties, is being repeated today.

I suggest that the members of the Mining Congress and mining men everywhere urge the expansion and strengthening of the United States Geological Survey. It will aid the prospector and small operator through increasing our knowledge of the geology of our mineral deposits, and likewise benefit the people of this nation by extending the life of our mining industry. Never was our weakness in the matter of a comprehensive understanding of our natural resources by government better exhibited than in the present emergency.

Role of the Mining Geologist

Thus, the aims of mining geology are noted. The mining geologist, as well as the mine operator, has an important role to play. For his aids he should choose as "allies," good geology, geophysics, and a better understanding of the laws of ore deposition. He should cast adrift ruthlessly, "hunches," "chance" and "Lady Luck," and do everything possible to keep mining geology on a sound basis. He must urge better and more practical mining geology training in colleges for men who expect to be of direct service to the mining industry, and continue to do all possible to develop among operators a better understanding of the value of "mining geology" to mine operations.

Combined Metals to Complete Pioche Mill Shortly

Construction of a 450-ton lead-zinc concentration plant by the Combined Metals Reduction Co. at Pioche, Nev., is going ahead on schedule, with completion expected shortly, according to E. H. Snyder, of Salt Lake City, vice president and general manager.

The $600,000 plant will be the largest mining development in the famous Pioche mining region in many years.

The crew is being expanded as development of the project requires it, he said. In addition to the main plant to house the ore treating mill, numerous other buildings and storehouses are being erected.

The plant is being built at the Caselton shaft of the Combined Metals Reduction mine, seven miles from Pioche. The mill also will treat ore from the Prince mine nearby, another property of Combined Metals Reduction Co.

The Excess Profits Tax and Western Mining†

By LEO J. HOBAN
Secretary
Hecla Mining Co.

IN the excitement attending the recent enactment of the excess profits tax, we have almost forgotten that the excess profits tax is the second tax bill passed in 1940. The first one, however, was relatively innocuous, and presents no special problems, being concerned principally with raising the tax rates and reducing the exemptions. For this reason, this paper will discuss only the second revenue act of 1940—the Excess Profits Tax Act.

It is not my intention to criticize the imposition of an excess profits tax, as such. A reasonable excess profits tax is as fair a taxing method as any other, and we should favor and support such an act, if properly drawn and properly administered. It is felt, however, that the second revenue act of 1940 has not been properly drawn, and there is considerable doubt as to whether it will be fairly administered. It is defective in certain vital respects—the defects will be pointed out in the remarks which follow.

Function of an Excess Profits Tax

Strangely enough, the ideal function of an excess profits tax is not to increase governmental revenue. A properly designed and administered law, and one which serves the purpose for which it was intended, would, under ideal conditions, return little or no revenue to the government. The primary purpose of an excess profits tax is to prevent profiteering. The raising of prices, and hence the enhancement of profit, during a period such as this would be largely prevented, certainly retarded, by an excess profits tax which recaptured for the government the bulk of the income considered to be in excess of normal. If the Excess Profits Tax Act accomplishes its purpose, prices will not be raised unduly since there will be little advantage accruing to the taxpayer through such action.

Neither, however, would there be any particular incentive for the taxpayer to increase production through expansion of facilities or otherwise, and, since expansion of production is one of the vital and necessary elements in our national defense program, the excess profits tax law, as enacted, must necessarily compromise between the ideal situation on the one hand, and the practical necessities of national defense on the other.

If the present law is to be an equitable one and one which can be administered without undue expense to either the taxpayer or the Treasury Department, certain of its provisions should be amended.

Computation of Base Period Income

Section 713 (b) provides that taxpayers electing to compute their excess profits credit through the use of base period income shall divide the base period income, after certain adjustments, by four. This method of computing base period income is inequitable for two reasons.

First, it uses for the base period four years which were not particularly profitable ones for American industry, and particularly not for the mining industry. Of the four base period years, 1937 was the only one in which the average corporation enjoyed average profits; the other three years were periods of subnormal income.

The second reason for deeming this method inequitable is that it averages income in the base period to arrive at the excess profits credit, but does not average income in the taxable period. Assuming that profits fluctuate during the first four of the taxable years in exactly the same pattern as they fluctuated during the four years of the base period, the taxpayer will find that in certain of the taxable years he is paying an excess profits tax, since in these years the income would be above the average of the base period. This will occur in spite of the fact that the taxpayer's aggregate income for the taxable years does not exceed his aggregate income for the base period years. If severe fluctuations in income occurred in the base period, and the same pattern of income obtained in the first four years of the taxable period, the taxpayer could have a situation in which he would pay out in normal and excess profits taxes more than his total aggregate income for the four years of the taxable period.

There are several methods by which the inequities of this particular provision can be wholly or partially overcome. The most reasonable one would appear to be to provide for the averaging of income in the taxable years as well as in the base period.

Another method would be to allow the taxpayer to select as his base period any three out of the four base period years, dividing the aggregate amount by three to arrive at the excess profits credit. The late Senator Pittman offered an amendment which would have allowed this method to be used and the Senate accepted his amendment, but the provision was eliminated in conference.

A third method, and the least satisfactory of the three, would be to allow an excess profits credit carry-over for at least three years for all corporations. The present law in Section 710 (b) 3 allows an excess profit

† Address delivered before Northwest Mining Association, Spokane, Wash., Dec. 7, 1940.

credit carry-over for one year, but only for corporations having less than $25,000 of normal tax net income in the year in which the carry-over is to be applied.

Attention is called to the fact that Great Britain, which is certainly in a more serious financial condition than the United States, for excess profits tax purposes, does average profits over a period of years. It also allows a net loss carry-over for six years.

Penalty on Use of Base Period Income

In the present law there are two discriminations against the use of base period income in computing the excess profits credit. If the taxpayer elects to have his excess profits credit computed on base period income, the normal tax net income for the base period must be reduced by the amount of normal tax paid for the four years of the base period, and, for the years 1936 and 1937, by the amount of any undistributed profits tax paid. The remainder is then reduced by an additional five percent. If the taxpayer elects the use of invested capital neither of these penalties is applied. It is well known that the Treasury Department does not look with favor upon the use of base period income in computing the excess profits credit; it believes the taxpayer's credit should be limited to a percentage of invested capital. Equitably, there would seem to be no good reason why a taxpayer electing one base should pay a penalty as against a taxpayer electing the alternative base. The penalty on the use of base period income should be eliminated.

Election of Method

Section 712 (a) provides that the excess profits credit for any taxable year shall, at the election of the taxpayer, made in its return for such taxable year, be computed on either base period income or invested capital. Base period income is the normal tax net income for the years 1936 to 1939, inclusive, less the normal tax and any undistributed profits tax paid on such income, and subject to certain other adjustments which it is unnecessary to discuss here.

In the case of many corporations the income tax returns for the years 1938 and 1939 have not yet been audited, and, therefore, the normal tax net income has not been finally determined, and, in other cases, the normal net income for the years 1936 and 1937 is in dispute. Even though a taxpayer may feel that he has sufficient information on which to make an election of the method by which he wishes to have his excess profits credit computed, he may find that, when the years in question are audited, there will be substantial differences between the normal tax net income as shown by his return and the normal tax net income as finally determined.

It would seem, therefore, that the taxpayer should be allowed the right to make his election at the time his taxable status for the year is finally determined. It is inequitable to compel the taxpayer to make an election at a time when the basic figures on which his election is to be made are unknown.

During the hearings before the Senate Finance Committee, Assistant Secretary of the Treasury Sullivan stated his opinion that the taxpayer should have this privilege. Unfortunately, an amendment to this effect, offered by Senator King, was not accepted by the Senate, and therefore the proposal had no chance to be incorporated in the bill as enacted. It is believed that this amendment will be offered again when the excess profits bill is up for revision.

Borrowed Capital

Section 719 (a) defines what shall constitute borrowed capital and 719 (b) provides that borrowed invested capital for any day shall be an amount equal to 50 percent of the borrowed capital for such day. Section 711 (a) 2 (B) provides that in computing the excess profits net income the deduction for interest shall be reduced by an amount equal to 50 percent of so much of such interest as represents interest on the indebtedness included in daily amounts of borrowed capital. In many instances borrowed capital is as much a part of invested capital, and has as much to do with the earning power of the corporation, as has equity invested capital.

It was stated during the hearings, by the Assistant Secretary of the Treasury, that corporations could borrow money from two and one-quarter per cent to two and one-half percent, and the Treasury did not feel that the corporation should be allowed to include in invested capital the full amount of borrowed capital, borrowed at such rates, and on which it would receive an eight percent invested capital credit. In passing it might be remarked that the Treasury representative, in referring to interest rates, must have been thinking of the rate of interest it pays for borrowed money, not that paid by the ordinary corporation, and particularly not by a corporation operating in these western states.

Since it is mandatory that invested capital be computed on a daily basis, it would certainly simplify the computation of daily invested capital, and with no great loss of revenue, if borrowed capital could be included in full in invested capital for the purpose of determining the excess profits credit.

There is one other situation in regard to borrowed capital to which reference should be made. The inclusion of borrowed capital in invested capital is mandatory. Some corporations, having borrowed capital of negligible amount in relation to their equity capital, might wish to ignore the borrowed capital completely in order to simplify the computation of daily invested capital. Since, under no conceivable situation could this result in any loss of revenue to the Treasury, the taxpayer should have the right to ignore borrowed capital if he wishes to do so.

Daily Invested Capital

Section 715 provides that the invested capital for any taxable year shall be the average daily invested capital for such year determined under Section 716. Considerable protest against the provision for daily computation of invested capital was made when the hearings were in progress on the bill. It was pointed out that the invested capital of many taxpayers could be computed on a monthly, quarterly, or other appropriate basis, without loss of revenue. Senator Harrison, chairman of the Senate Finance Committee, offered the following amendment to correct this situation:

> "The commissioner may, under regulations prescribed by him, with the approval of the Secretary, permit in the computation of invested capital, the use of averages or other ratios on a monthly or annual or other appropriate basis, where, in his opinion, the circumstances do not require daily computation."

This amendment was agreed to in the Senate, and, it is understood, was also agreed to in conference, and was turned over to the drafting clerks to put the amendment in appropriate language. In the bill as enacted, this provision is as follows:

> "If the commissioner finds that in any case the determination of invested capital on a basis other than a daily basis, will produce an invested capital differing by not more

than $1,000, from an invested capital basis, he may, under regulations prescribed by him, with the approval of the Secretary, provide for such determination on such other basis."

The purpose of Senator Harrison's amendment, of course, was to do away with useless clerical labor in computing invested capital. As enacted, however, the taxpayer for whose benefit this provision was inserted would be required not only to make the daily computation of invested capital, but would also be required to make another computation based on some other basis that he thought was fair and equitable, and which could be used only in case it did not differ by more than $1,000 from that based on the daily computation. This, of course, is no relief at all; it is the very opposite. It is thought that Senator Harrison's amendment giving the commissioner discretion in the matter is reasonable and should be included in any amendments to the law.

Tax Brackets

In the original report of the subcommittee of the Committee on Ways and Means of the House of Representatives released on August 8, 1940, it was proposed that the tax brackets should be based upon certain percentages of the excess profits credit. During the hearings on this proposal, however, it was brought out that this would work an undue hardship on small income corporations, and it was suggested that while the method originally proposed should remain in force for those who wished to elect to be taxed on that basis, that specific dollar amounts should be included in the tax brackets for the benefit of the smaller taxpayers. The Congress, sensitive as always to the needs of the smaller taxpayer, acceded to the request that the tax brackets be computed in dollar amounts. However, it eliminated the original provision that tax brackets be computed on the basis of a percentage of the excess profits credit. The tax brackets and rates of tax as finally enacted are as follows: 25 percent on the first $20,000 of excess profits income; 30 percent on the next $30,000; 35 percent on the next $50,000; 40 percent on the next $150,000; 45 percent on the next $250,000, and 50 percent on all in excess of $500,000.

When it is realized how small a credit these brackets allow in relation to large incomes, it will be seen that substantial inequity is proposed for those corporations having large incomes whose increase in income, in percentage, may be relatively small. Take the example of a corporation having $10,000,000 excess profits credit, the income of which in the first taxable year increased 10 percent, or $1,000,000. The excess profits tax on the extra $1,000,000 of income would total $334,000 after reduction by the 24 percent normal tax; the total normal and excess profits tax chargeable against the $1,000,000 of excess profit is $574,000. It would certainly seem equitable and reasonable to compute the excess profits bracket on the basis of a percentage of the excess profits credit, for those corporations electing to have it computed in this way.

Excess Profits Credit Based on Invested Capital

Section 714 provides that the excess profits credit based on invested capital shall be an amount equal to eight percent of the invested capital. Unfortunately, a flat allowance for all industries takes no account of the different hazards of different industries. It brings all industry to the same

REVISION OF EXCESS PROFITS TAX

Recommendations of Northwest Mining Association

At its 46th Annual Convention, in Spokane, Wash., December 7, 1940, the Northwest Mining Association went on record in favor of the following changes in the Second Revenue Act of 1940:

1. **Base period income should be computed for any three out of the four years provided in the law.**
2. **Penalty on the use of average earnings method should be eliminated.**
3. **Adequate special relief provisions should be included to meet those situations which arise because of the fluctuating character of mining operations.**
4. **Tax brackets should be determined at the option of the taxpayer through percentage of credit as well as in dollar amounts.**
5. **There should be a provision for applying unused excess profits credits in the taxable years.**
6. **There should be provisions for election of excess profits credit method at the time when taxable status is finally determined.**
7. **The commissioner should be permitted discretion to compute invested capital on other than a daily basis when, in his judgment, such other basis will not increase the excess profits credit.**
8. **Borrowed capital should be included in invested capital in full rather than at 50%. Taxpayers should have the privilege of excluding borrowed capital in computing invested capital if they so desire.**
9. **Excess profits credit based on invested capital should be at a rate not less than 15% in a business as risky and hazardous as mining.**
10. **Relief provisions should be broadened and administered by a special board independent of the treasury.**
11. **Property paid in for stock should be valued on the basis for computing gain, thereby making it unnecessary to go back of March 1, 1913.**
12. **Because of the fact that innumerable instances of extreme hardship will arise in the application of an excess profits tax to the mining industry, it is essential that a broad provision be included which, upon a proper showing, will afford relief in cases of abnormalities of income or capital. This is particularly true because the years 1936 to 1939 cannot be considered normal in the mining industry. The present provision of the act relating to abnormalities is not satisfactory. If administered by the Treasury it will work decidedly to the disadvantage of the taxpayer. Such abnormal situations should be passed upon by an independent board.**
13. **We favor the exemption of new mining enterprises from the imposition of excess profits taxes for a period of three years after it has passed from the development to the productive stage. This for the reason that increased metal production is essential to the defense program.**

level. It does not differentiate between the comparative safety of money invested in, for instance, banking and financial corporations, as against the risk of hazardous enterprises, such as mining. Eight percent may be too much or too little for a banking business—I do not know—but I am certain that no money is going to be attracted to mining ventures when the normal income will be limited to eight percent of invested capital and excess profits taxes will be paid on incomes in excess of that amount. In view of the short period of production of many mines and the hazards involved in the expenditure of money in searching for and developing mining properties, it would certainly seem that a rate of not less than 15 percent should be allowed to corporations engaged in mining.

Value in Invested Capital of Property Paid in for Stock or as a Contribution to Capital

Section 718 (a) 2 provides that property paid in for stock or as a contribution to capital shall be included in invested capital in an amount equal to its basis (unadjusted) for determining loss upon sale or exchange. This provision is going to be the cause of a great many headaches, and is going to be most difficult to administer. If this provision had read that the property should be included in an amount equal to its basis for determining gain upon sale or exchange, there would be no necessity for going back of March 1, 1913. It is a certainty that many corporations organized prior to March 1, 1913, which have absorbed other companies during the course of their careers, and which have had property paid in for stock, or as a contribution to capital, or as paid-in surplus, during any of the years of their existence, are going to find it very difficult to determine and prove the value at time of acquisition of the property so received. It is recommended that this provision be changed so that there shall be no necessity of going back of March 1, 1913.

Relief Provisions

Section 721 provides that abnormalities of income shall be taken into account in computing excess profits taxes. Section 722 gives the Commissioner blanket authority to make such adjustments as may be necessary to adjust any abnormalities affecting income or capital; his decision being subject to review by the Board of Tax Appeals. The relief provisions of these two sections are not wholly satisfactory. From the wording of Section 722, it is apparent that its provisions are as likely to be used against the taxpayer as they are to give him relief.

There is a strong feeling among taxpayers that adjustment of abnormalities should not be left in the hands of the Treasury Department, which will administer the technical provisions of this law. It is felt that the only satisfactory method of providing relief from the abnormalities which must arise under an excess profits tax would be through the establishment of a special board, independent of the Treasury, to decide each case on its merits.

Increased Production from Mines

It is well recognized that the mining industry is an industry of wasting assets. Once a pound of metal is removed from a mine, it is gone forever; the greater its annual production, the shorter will be its life. While the actual number of units remaining in a mine may be unknown, nevertheless it is a fixed quantity.

National defense needs are going to call on the mining industry for substantially increased production, yet, at the same time, the price stabilization division of the national defense commission is criticizing moderate increases in metal prices.

To clearly illustrate the difficulty confronting the metal miner in the face of an increased demand for his product, little increase in metal prices, and an excess profits tax, let us take the hypothetical example of a mine producing 250,000 units per year, on which it ordinarily makes a profit of $1 per unit. Under pressure of national defense needs, production is increased to 350,000 units, still at a profit of $1 per unit. It is true that profit for the year in question has increased from $250,000 to $350,000, but has it made excess profits of $100,000? Clearly not. It has depleted the only resource it has at an accelerated rate, with no increased profit per unit. Yet under this bill it will pay a substantial excess profits tax on the profit resulting from increased production.

To properly compute excess profits in the mining industry, there should be recognition of the fact that allowance must be made for the rate of output at the time the profit was won.

Summary of Law's Defects

The defects and inequities of the present law, therefore, may be summed up as follows:

(a) It imposes excess profits taxes on what are in effect normal profits.

(b) It is almost incomprehensible as to some of its provisions.

(c) It is especially burdensome to mining operations.

(d) It imposes inequitable burdens on newly established corporations where good management, and long hours of work by those in control, are more important than and, to a certain extent, take the place of, invested capital.

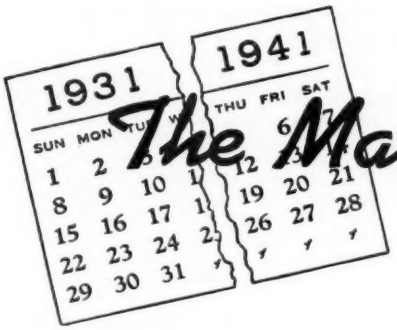
(e) Generally speaking, it probably will impose a greater burden on small corporations than on large corporations.

(f) It probably will discourage the starting of new enterprises, particularly where the enterprise is in such a hazardous industry as mining.

Before concluding, attention is called to the fact that information coming out of Washington indicates that revision of the excess profits tax law will be undertaken in 1941. However, the taxpayer should be alert to the fact that the principal provisions being proposed will not reduce the burden of the taxpayer; on the contrary, the revisions proposed, if enacted, will increase that burden. So far as I am informed, there is no intention of correcting the several defects here pointed out. Generally, the information received has intimated that the normal corporate tax rate may be upped to possibly 30 percent on incomes in excess of $25,000; that corporations having fiscal years may be compelled to file returns on a calendar year basis; that the allowance for invested capital may be reduced from eight percent to seven percent, or possibly six percent; that corporations may not be allowed to elect to use base period earnings, but will be compelled to use invested capital. It is essential that taxpayers, both as individuals and as organizations, should promptly acquaint their representatives in Congress as to their views on these proposed revisions.

Utah Copper at Capacity

The Utah Copper Company's copper mine in Bingham Canyon, Utah, principal individual mine unit of the Kennecott Copper Corporation, is producing at capacity, which is about 40,000,000 pounds of recoverable copper per month.



The March of COAL MINING

Ten Years of Progress

A FORECAST of FUTURE TRENDS

By G. B. SOUTHWARD
Mining Engineer
American Mining Congress

AT THE beginning of the new year, instead of presenting a resume of past accomplishments in the development of modern coal mining, suppose we vary the schedule and venture a few prophecies. Not by crystal gazing but by examining present trends and seeing in what direction they are leading. The force that will fix this direction will continue (as in the past) to be economic pressure, and the new developments will be the result of this pressure, rather than the desire to make improvements.

Revolutionary Inventions Improbable

A good way to begin our forecast is first to see what will not be done. This may seem like going into reverse, but it is really just by way of getting a clear view ahead. What will *not* happen is this: there will be no new and startling invention of a device or method that will revolutionize coal mining and automatically advance progress several jumps ahead of where it is today. This, of course, could happen—on the theory that all things are possible—but we are confining this discussion to what we think is really going to occur.

So, looking into the future, the advancement of coal mining will not be by short cuts or easy paths but by hard thinking and intelligent planning to take the fullest advantage of the machines, material and methods that are already known and in use. Naturally there will be improvements in present equipment and decided increases over present production performances; mechanization in coal mining is just in the exploration stage, and its possibilities are by no means fully developed or utilized.

Since the development of modern mining will be through refinements of present general practices, one of the things which will come in for major attention will be the reduction of waste in time and material—in other words, "taking up the slack."

Better Materials Needed

Delays from breakdowns will be greatly reduced, partly by better maintenance and inspection, but to a further degree by improvements in equipment design and in the quality of materials used. This will apply to everything underground, from heavy mobile machines down to light supplies and material; for tracks, power lines, timbering, and so on, clear through the tipple.

The foregoing does not mean that manufacturers today are slighting this feature—just the opposite is true, and the manufacturers are giving the operator exactly what he is willing to pay for. The operator in the future, however, will be willing to pay for better materials, as he will find that his mine cannot afford the cost of labor and material for replacements that could be eliminated by buying higher quality in the first place.

The use of power will continue its upward curve; correct methods of using machines will receive increased attention, and along with this will come proper training and education for the machine runners. The Power and Mechanical Departments are going to have a great deal to say about how the future mine will be laid out and operated.

Extension of Coal Preparation

There will undoubtedly be an enlargement in the scope of mechanical coal preparation. Present cleaning processes have already shown what can be done along these lines, but we are only just beginning to find out the possibilities. One definite development we can look for in this connection will be an increase in the quantity of material that will be processed and a lessening of the amount of wasted fuel that is now being left in the mines or sent over the slate dump.

This will have the further effect of swinging the trend away from thin seam mining back toward the thicker veins. The consumers demand for better quality products has done much toward encouraging the application of machine methods in low coal, and in clean portions of thick seams, but low coal, even of high quality, is more expensive to mine, by any method, than high coal. The thin seams, therefore, will become less able to compete against the combination of mechanical loading and mechanical cleaning in the thicker veins.

Roof Support

Another thing which we can expect will be a more scientific approach to the problems of roof support. Timbering practices now used, particularly at the face, are the result of years of hand-loading experience, and these do not fit in with mechanical loading. In addition to improved designs for roof supports, methods of sealing the top against deterioration will be more widely applied.

Progress in Mining Practice and Equipment

(*Continued from page* 27)

other Western States. There is a further possibility that these ores not readily amenable to concentration by flotation can be treated by leaching methods.

Professor Gore referred to small capacity plant failures, and I recall that Mr. E. W. Engelmann referred to this matter in his review of concentration and milling for the year 1939.

The Arizona Bureau of Mines staff has been considering the possibilities of improving matters in Arizona in this respect, and it is likely that the Bureau will offer an ore testing service for the small-scale operators.

There are no commercial ore testing activities in Arizona and, furthermore, with the limited business available, it is very doubtful if ore testing can be conducted as a business proposition.

It is expected that an ore testing service as mentioned will be of value in preventing the erection of some plants not justified by ore available, and of value in decreasing the number of failures due to improper or incomplete testing.

Referring to the field of non-metallics, there is a general feeling that the next few years will see a marked increase of interest in this field. Although there is some production of non-metallics in the Southwest, many express the view that the possibilities in this field have not been thoroughly investigated.

In a recent trip to many of the research and testing laboratories in the United States and Canada, I was impressed with the constructive work being done by Mr. Coghill and his staff at Tuscaloosa and Mr. Ralston and his staff at College Park, Md., in the field of non-metallic mineral dressing.

In studying the possibilities in this field the problem involves not only a search for non-metallic deposits but also a comprehensive study of mineral dressing possibilities for each deposit and markets available for the product of each deposit.

Mineral Land Withdrawals

(*Continued from page* 41)

this nation, not only during this era of emergency but during days of a more even tempo.

The locking up and sterilization of millions of acres of potential mineral producing lands of the Western States, situated in the public domain, constitutes more than a defense bottleneck. It is a policy that makes a mockery of our national efforts to weld an adequate and powerful national defense front. This present policy that permits of mineral land withdrawals keeps hidden from discovery and out of production many of those raw materials that we must have if we are to succeed in building our defenses.

Without newly discovered and developed sources of supply of essential strategic and critical raw materials, our defense program cannot succeed. The drafting of our man-power, increased pressure on production lines, and the steeling of our moral fibre—all will be futile. Let us look to an immediate release from the stagnant and dangerous bonds of sterilization of those millions of acres of the public domain now closed to mineral entry and location. Let us see those vast areas thrown open to prospectors once again, so that they may thus take their rightful places on this all-important national defense firing line. If these steps are initiated at once, the mining industry will not fail in the trust thus confided to it, but it will properly develop the necessary sinews for a solid first line of real defense for today and a sounder national asset for tomorrow.

Mechanization and Conservation of Coal

(*Continued from page* 29)

reserves, and in some places agriculture. Years are required for reclaiming land by these means, and it is indicated that planned reforestation will not only restore the stripped land to use but will provide a profitable investment in many areas. In some states coal companies are reclaiming stripped areas systematically by reforestation.

Strip-mining and the application of mechanical loading devices in underground coal mines have both been factors in improving the technique in extracting coal and in improving recovery, which, in turn, conserves coal deposits.

Ford Company Buys West Virginia Coal Property

The Fordson Coal Company at Twin Branch, W. Va., has been reported purchased by the Ford Motor Company. This acquisition probably marks the re-entry of the Ford company into the coal mining business.

The property has been idle for seven years and has an assessed value of $174,000.

Woodward Iron Co. to Open New Mine

The Woodward Iron Company, of Birmingham, Ala., is contemplating the expenditure of a large sum for opening a new iron mine in the Birmingham district. The company has just awarded a contract for air-conditioning its third blast furnace, having set a record as the first company in the world to air-condition a blast furnace.

New Sound Films Made Available by Bureau of Mines

The addition of two new sound films to its comprehensive collection of motion picture films illustrating the activities and achievements of the mineral industries is announced by the Bureau of Mines, U. S. Department of the Interior.

One of these is entitled "Alloy Steels—the Story of Their Development," and tells the wonder-story of those special products contrived through the years in the research laboratories of the world to make possible the tough, sturdy steels demanded by modern industry. The film is in 16- and 35-mm. widths and requires 20 minutes for showing.

The other film is entitled "Mineral Resources and Scenic Wonders of Arizona." The great natural resources of Arizona and the inspiring panorama of scenic splendor that annually attracts thousands of tourists to the state are picturized in this film, which is in 16-mm. size and which requires 40 minutes for showing.

Copies of these sound films in the sizes noted are available for exhibition by schools, churches, colleges, civic and business organizations, and others interested. Applications for the films should be addressed to the Bureau of Mines Experiment Station, 4800 Forbes Street, Pittsburgh, Pa. No charges are made for the use of the films, although the exhibitor is expected to pay the transportation charges.

Metals Reserve Company Contracts For Bolivian Tin Ore

Metals Reserve Company has entered into an agreement with Bolivian producers of tin concentrates, with the guaranty of the Bolivian government, to purchase tin concentrates sufficient to smelt 18,000 tons of metallic tin a year. The contract is for a five-year period and expenditures of $87,000,000 over this period have been estimated.

Metals Reserve Company will either build a smelter or contract with one of the smelting companies submitting proposals to build and operate a plant in the United States for smelting and refining the Bolivian ores.

The company has agreed to release to the British upon request a maximum of 6,000 tons of ore each year and to consider requests for more.

With the COAL DIVISION

of the AMERICAN MINING CONGRESS

MONTHLY COST STATEMENTS for MOBILE LOADING MACHINES

● ***Preliminary Report by the Mechanical Loading Committee***

THE Committee on Mechanical Loading is preparing a report on methods of cost keeping. It is not the intention to make up standard forms but rather to examine the cost keeping practices used by a number of representative companies and to submit recommendations as to the items of labor and material that should be charged to a mechanical loading operation.

Scope of Proposed Report

The complete report will cover daily, periodic and monthly records, but the committee has decided that their study should be confined to the so-called "unit operating cost," which includes only the work from the face to the intermediate or main line haulage. It is realized that there will be considerable difficulty in reconciling the many variances that now exist in present cost keeping forms and practices, but it is also believed that an agreement can be reached as to the basic items which make up the real cost of mechanical loading.

The decision as to what the basic items are will have to be given much careful thought. The size of the cost sheet, the width of the columns, and such things as to whether or not a previous month's records should be shown with the current month, are details which will come in for minor attention. A form convenient to prepare and easy to read is, of course, desirable, but the main job is to determine what work is properly chargeable to a mechanical operation, and then to recommend a system that will permit these charges to be made and set up. The question of breaking down the total cost into its various classifications must also be considered, and with this comes the question of how far these breakdowns should go. Accuracy, of course, is a prime essential, so there is no point in having subdivision figures that are distributed by pure guesswork.

As a preliminary step in making the study, the committee has prepared four monthly statement forms, shown in Figures 1 to 4 on the following page. These forms are based on present practices, but none of them is an exact reproduction of sheets actually in use; each one is abbreviated to show the items into which the cost is divided, and is confined to the unit operations from the face to the main haulage. The following discussions on Figures 1 and 2 are submitted by two of the committee members.

Discussion of Figure 1

"Our company does not have a daily cost report, as we think a daily report is not only unnecessary but is a waste of time and effort. The daily information which we find of more value is a 'Force Report.' This consists of a sheet on which is posted, each day, the number of man-shifts actually worked under each foreman, or subdivision, both inside and outside the mine. There are usually a certain number of men set up as a standard in the sections and any deviation from the standard number of men will be quickly noted. Of course, certain general crews have to supply substitutes for the sections and other such classifications as pumping and wiring, so the general crews will, as a rule, vary widely from day to day.

"Such a force report not only shows the number of man-shifts divided in any way thought best but it can also be amplified to show tons per man-shift on the mining section, and tons per man-shift over all. This report is very easily and quickly made each day and, in conjunction with the tonnage report from each section, the actual labor cost each day can be told very closely merely by comparing the total number of men working and the tonnage from each section, or from the mine as a whole. In most mechanical mines the number of men working each day, or shift, does not vary much; therefore, the labor cost varies almost entirely with the tonnage obtained.

"It is our practice to make a weekly cost sheet in a simplified form, but in our particular case the entire cost is figured out. However, the method of doing this has been simplified so it does not take much time. This cost report is designated as the 'Weekly Cost Sheet.'

"Our monthly cost sheet is, naturally, much more elaborate than the foregoing, and contains sufficient details. The principal divisions of this sheet are as shown on Figure 1.

"It is my belief that with the above set-up, a close control can be kept on costs. Naturally, at any mine, there will be at times investigation into costs of certain items and when a mine is first mechanizing or changing methods, there may be a need for a period of some weeks, or even months, of carrying additional cost reports.

"There is a tendency in some companies to continue reports indefinitely after they have once been started, with the result that the cost and work of preparing these becomes burdensome, but, like a lot of things once started, they are continued on even when they actually serve no useful purpose. It is our belief that all reports should be carefully considered and scrutinized at least once a year to see if they apply any longer, and if eliminations or simplifications can be made."

Discussion of Figure 2

"This form is submitted to show items on monthly cost statements as used by our company for machine loading. This 'block' includes all the costs *as classified* in-by the main side track—except the 'swing motor.' Other classifications, such as wiring, bratticing, pumping, sprinkling systems, swing motor, etc., are carried in the 'Other Labor' and 'Other Supply' divisions of the general cost statement. The only reason for this (whether it is good or bad) is the inaccuracies in obtaining proper distribution of this expense to individual machines or even mine sections.

"Where more than one machine is operating in a section, we encounter some difficulty in distributing the labor on line 8 (particularly), to the several machines. This latter is not a factor on the monthly cost statement, as all machines are grouped, but the distribution is necessary for daily (or other period) reports, and these daily reports are necessary.

"The spaces marked (X) have no charges; and on line 7 the second and third columns are reserved for shuttle car operation only, as maintenance costs of gathering locomotives are grouped elsewhere on the cost statement with all other gathering locomotives—because of difficulty of distribution. No charges are permitted on line 8 in the second and third columns.

"The daily form for individual loading machines cover all operating labor only, for classifications shown in column (1) of monthly cost statement form, as in our experience operating labor is the only cost which can be improved by a daily report. Personally, we believe the daily form should not cover too much detail, as periodic mine costs (15th, 22nd and last) will show generally where variations occur.

"It is probably true that the customary forms can be somewhat simplified, and answer the same purpose. But it must be remembered that, while it may be advantageous to include 'Loading,' 'Cutting and Drilling Operating Labor' (lines 1, 2, 3), column 1, on the monthly cost in one group, we certainly want to keep separate records of what the maintenance costs of these items are. Scrapping may be included on line 8, and there is considerable doubt if any accurate separation can be made for line 6. Again, it is very doubtful if maintenance labor (column 2) can be properly split between lines 1, 2 and 3, but the separation as to supplies is valuable."

MONTHLY COST STATEMENT FOR MOBILE LOADING MACHINES

Accounts	Amount This Month	Per Ton This Month	Per Ton Last Month	Bogey Per Ton	Sub-Division		
					Labor	Maint.	Supply
Timbering							
Tracklaying							
Cutting							
Drilling							
Shooting							
Loading							
Gathering							
Dead Work							
Supervision							
Total Cost							

NOTE: In addition to the cost items shown above, the monthly statement also shows: yields; productions per shift; productions per man-shift, etc.

Figure 1

Comparison of Cost Sheets

In correlating the ideas represented by these four forms, a number of differences in cost keeping practices are at once apparent and also a number of similarities.

Three of the reports—Figures 1, 2 and 4—include repairs and maintenance as a part of the regular unit operating cost. This indicates that these companies have found it advisable to set up a method for maintaining a close scrutiny on mechanical breakdowns. Form No. 3 does not indicate how the repair charges are made, so maintenance apparently is carried as a separate item for the entire mine, without distribution between the individual units.

Two of the sheets—Figures 3 and 4—show separate costs on each individual unit, while Figures 1 and 2 combine all the units into a consolidated cost. This, of course, refers to the monthly statement only; the individual daily reports always cover the performance of each individual unit.

The method of subdividing the work of the unit crew into the different classes of operation shows fair agreement. Figures 1 and 2 are almost similar in this respect, while No. 3 goes into more detail. Report No. 4, however, combines all of the work under

MONTHLY COST STATEMENT FOR MOBILE LOADING MACHINES

MACHINE LOADING	OPERATING LABOR		MAINTENANCE LABOR		SUPPLIES	
	Amount	Per Ton	Amount	Per Ton	Amount	Per Ton
1. LOADING (TONS)						
2. CUTTING						
3. DRILLING						
4. SHOT FIRING			XXXX	XXX		
5. SCRAPPING			XXXX	XXX	XXXX	XXX
6. YARDAGE & FAULTS			XXXX	XXX	XXXX	XXX
7. INITIAL GATHERING						
8. TIMBER, TRACK & SLATE			XXXX	XXX	XXXX	XXX
9. TOTAL						

Figure 2

three major classifications—face preparation, loading and haulage. The "explanation" in the footnote shows the different operations which are included in each of these major cost subdivisions.

The foregoing paragraph brings out a point on which there is some controversy among operating companies—that is, the best way to subdivide the entire unit crew between the different operations to be performed. Some operators, as indicated by report No. 4, believe that greater efficiency is had by diversifying the work of each man rather than specializing it. In other words, to separate the total crew of the unit into two or three small groups, and have each man perform different kinds of work during the shift—when and where needed. Such companies feel that confining men to certain specific tasks will result in lost time because it is not possible to get a practicable balance in the amount of work to be done.

The practice of showing on the cost statement a predetermined figure which the operations have to meet is illustrated in Figures 1 and 3. No. 1 expresses this as "bogey" and sets it up for each of the individual cost items; No. 3 uses the term "standard cost" and applies this only to the two major subdivisions of labor and supplies.

Conclusion

Mechanized mining requires an entirely different cost set-up than is used in hand mining, but mechanized mining has not been in operation for a sufficient length of time to have developed cost keeping practices that are generally agreed to be correct. The situation is further complicated by the fact that mechanical methods are constantly changing and improving, and a cost statement that was designed for an operation a few years ago may not be suitable today. Then, too, there are different types of equipment, mining methods, and seam conditions, and many companies in making up their cost forms are influenced to a large degree by some special condition that has a direct effect on their production. The committee, in preparing their study, admits all these factors, but believe that an investigation will develop recommendations for uniform cost practices that will be generally acceptable.

Submitted November, 1940.

S. M. Cassidy, *Chairman.*
Geo. S. Brackett.
W. R. Cuthbert.
C. W. Gibbs.

MONTHLY COST STATEMENT FOR MOBILE LOADING MACHINES

	Unit No. 1	Unit No. 2	Unit No. 3	Total
SUPERVISION				
Crew Supervision				
Section Supervision				
Total Supervision				
MINING				
Face Crew				
Yardage				
Deadwork				
Slating and cleaning up				
Total Mining				
MISCELLANEOUS				
Gathering Haulage				
Timbering				
Recovering Material				
Sprinkler				
Handling Supplies				
Rock Dusting				
Drainage				
Total Miscellaneous				
TOTAL LABOR				
Actual Cost				
Standard Cost				
OPERATING MATERIALS				
Explosives				
Miscellaneous				
Total Supply Cost				
Standard Supply Cost				

NOTE: The monthly cost sheet shows tonnage per period, per machine shift, and per man-day, and also machine shifts per period and man-days per shift.

Figure 3

MONTHLY COST STATEMENT FOR MOBILE LOADING MACHINES

	Oper. Labor		Maint. Labor		Supplies		Total	
	Amt.	Per Ton	Amt.	Per Ton	Amt.	Per Ton	Amt.	Per Ton
FACE PREPARATION								
Unit 1								
Unit 2								
etc.								
TOTAL								
LOADING								
Unit 1								
Unit 2								
etc.								
TOTAL								
HAULAGE								
Unit 1								
Unit 2								
etc.								
TOTAL								
TOTAL								
Unit 1								
Unit 2								
etc.								
TOTAL								

Figure 4

"Face Preparation" will include cutting, drilling, shooting, clean up, bratticing and timbering at face and portion of Face Boss salary. "Loading" will include operation and maintenance of loading machine plus portion of Face Boss salary. "Haulage" will cover from face to mainline side track, and will include operation and maintenance of gathering locomotive, track laying, hanging wire, timbering in entries, and portion of Face Boss salary.

WHEELS of Government

● *As Viewed by A. W. Dickinson of the American Mining Congress*

DOGGEDLY determined in its line of duty, the few members of the 76th Congress remaining in Washington maintained the death watch of the long and dreary session until the drab end on January 2. Manifest in the long wait was the determination of Senate and House members to check against any possible indiscretion which might involve the United States in war. Sole release from the monotony of the December weeks was the House action in approving the Senate amendments to the Walter-Logan bill, by a vote of 176-51. The later vote on the President's veto, 153-127, lacked the necessary two-thirds majority to override, and marked the death of this constructive legislative effort for the time being.

Late in December the national appeal for a strong man to coordinate defense activities was partially met by the creation of the "Office of Production Management" with William S. Knudsen as director. The other members of this body are the Secretaries of War and Navy and Sidney Hillman, the labor representative on the National Defense Advisory Commission. In creating the Office of Production Management the President still insisted that final authority on matters before the Board must rest in him.

Washington observers generally believe that in working with the new Congress, the Administration will confine itself to national defense and foreign policy matters and will not enter strongly into the coming legislative activity on taxation and domestic affairs. Such a policy is designed to avoid involvement which might result in a militant anti-Administration attitude on the part of the Senate and House.

Taxation Talk

While the Treasury and the Joint Committee on Internal Revenue Taxation are continuing their labors in examining additional sources of revenue, it is now believed that there will be no general revenue bill until some time after the March 15 income tax returns have been received. Decision as to corrective amendments to the excess profits tax law has not as yet been announced, but it is expected that the House Committee on Ways and Means will begin work on a bill some time in January.

The National Defense Advisory Commission has announced that application for amortization deduction certificates should be filed before January 7 (30 days before the deadline provided in the law) and that unless this is done no assurance can be given that the applications will be acted upon in time to meet the law's provisions.

"Collar-to-Collar" and "Dry-to-Dry"

On December 11 and 12 a conference was held in Salt Lake City at which Examiner Harold Stein, Wage-Hour Division, U. S. Department of Labor, presided and took testimony from representatives of the International Union of Mine, Mill and Smelter Workers and from representatives of western mining companies. The conference resulted from the request of a number of Birmingham, Ala., iron ore miners' representatives that time spent in traveling to and from the working place in mines be considered as "hours worked." There will be a further hearing in the Birmingham district on January 14.

All of the time on December 11 was consumed by presentation of the views of the International Union of Mine, Mill and Smelter Workers, which was handled by Lee Pressman, general counsel of the C. I. O. A miners' union representative from Butte, Mont., testified at length concerning working practices in the Butte mines and in some of the smaller Montana properties. His testimony was intended to show that men are acting under orders and performing various duties from the time they leave the "dry" (miners' bathhouse) when going on a shift until they return to the "dry" upon coming off shift. Following the testimony of a union representative from Utah, the president of the International Union of Mine, Mill and Smelter Workers, Reid Robinson, of Denver, Colo., testified that he had worked at Butte for seven years and that the practice there is for the men to go in on company time and to come out on their own time; he further stated that what the miners are really after is a shift of work which will be measured from the time a man leaves the change-house until he returns to the change-house, or in other words from "dry-to-dry." Under cross-examination Robinson testified that his union has contracts with the Tennessee Coal and Iron Company in the Birmingham district.

Lee Pressman then took the stand and testified concerning a number of contracts which the miners' union has with mining companies in various states. He cited sections of Bulletin 13 of the Wage-Hour Division and also made reference to a collar-to-collar ruling made by the Attorney General of Colorado. Pressman's statement on this ruling was immediately refuted by a mining company representative from Colorado who stated that the Attorney General had reversed his earlier decision.

On December 12, W. H. Hoover, counsel for the Anaconda Copper Mining Company, presented as witnesses W. B. Daly, former general manager of mines; J. J. Carrigan, present general manager of mines; and D. M. Kelly, vice president, all of Butte, Mont. These witnesses presented facts concerning the Butte operations and Carrigan testified that the underground men proceed into the mine and to their working places on company time, eat their lunch on their own time and return to the shaft on company time and are then hoisted on their own time. Vice President D. M. Kelly testified that in the wage negotiations

in 1939 the basic wage was raised to $5 and that this was given in lieu of the demand for the 8-hour collar-to-collar shift. This arrangement was accepted by a vote of the Butte Miners Local of 2,260 to 1,465. He also emphasized that in his opinion the Congress of the United States fully intended that the 40-hour week should be a 40-hour week at the point of production.

Fifty-six representatives of mining companies were present at the hearings and further facts were presented by Carl Trauerman and Therrett Towles for Montana, J. S. Coupal for Arizona, George Rupp and Edward D. Dickerman for Colorado, J. S. Dugan for California, A. E. Peterman, Jr., for Michigan, N. P. Goodrich for South Dakota, J. J. Lilley for Nevada, and A. G. Mackenzie for Utah. Many briefs will be filed, February 1 having been set as the closing date.

Legal Juggling on the St. Lawrence Project

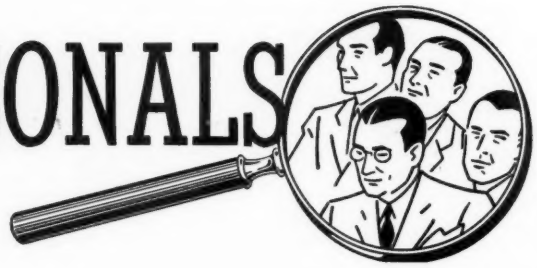
During December Assistant Secretary of State A. A. Berle, Jr., carried a message from the President to the Great Lakes Seaway and Power Conference which met in Detroit. The message urged that power is needed for the production of aluminum and other munitions and spoke of the need of shipyards on the Great Lakes as a defense requirement. The President further said "What this project means to the ordinary man and woman cannot be too highly stressed. It means a more secure nation. It means a continent protected and served by the additional shipping built in inland shipyards. It means more industries, both defense and domestic, thriving on the cheapest power in history. It means more comforts in the homes of many cities and rural areas. It means more work for the ordinary citizen in shipyards, factories, and other transportation services connecting the center of this continent with this great highway to and from our national and international markets."

It has been evident for some months that the Administration hopes to legalize the St. Lawrence Waterway and Power Project without the necessity of going to the Senate for ratification by a two-thirds vote. It has now been stated that a U. S.-Canadian boundary water treaty approved in 1909 embodies the authority to construct the St. Lawrence Waterway and Power Project and that the only further step required is the enactment of "concurrent or reciprocal legislation on the part of Congress and the Parliament of the Dominion." Under this arrangement apparently all that would be needed would be a majority vote in the House and Senate.

Defense Action on Metals

The agitation for procurement of foreign copper as a safeguard in the event of an emergency has resulted in the Metals Reserve Company (RFC) purchase of 100,000 tons of copper from the Spanish-American countries to the south. Export licensing restrictions have been placed on iron ore, pig iron, ferro-manganese, spiegeleisen, ferrosilicon, ferrochrome, ferrophosphorous, and ferromolybdenum as well as upon certain iron and steel manufactures. Director W. C. Mendenhall, of the U. S. Geological Survey, has formally stated that in case imports of quicksilver and tungsten should cease this country could supply its own need; also that the production of antimony and manganese can be materially increased. The arrival of the new year carries the heartening assurance that the work of the Defense Commission and other Federal agencies interested in safeguarding the nation's mineral need is producing results. Time has been required to coordinate effort but the accomplishment is such that the mining industry may point with pride to its representatives in the Government service.

PERSONALS



Paul L. Shields has been named vice president and general manager of the United States Fuel Co., Newhouse Building, Salt Lake City, Utah. Mr. Shields has been assistant general manager since August, 1939, and he succeeds J. D. Harlan, resigned to become more closely associated with the parent company. Mr. Shields is also president of the Utah Coal Operators' Association.

Jesse L. Maury, of the Lehman Corporation, New York City, has been appointed a member of the visiting committee for the Department of Geology of the Massachusetts Institute of Technology.

Richard Maize of Uniontown, Pa., has been appointed state secretary of mines by Governor James of Pennsylvania. He succeeds the late John Ira Thomas, who died last summer. Maize, a native of Scotland, came to Pennsylvania when 4 years old. His career began as a trapper at 12. He is a graduate of the Ohio State University as a mining engineer and for some years served as superintendent of the Pittsburgh and Westmoreland Coal Co.

Howard I. Young, President of the American Zinc, Lead and Smelting Company and President of the American Mining Congress has been elected a director of the Mississippi Valley Trust Company of St. Louis, Mr. Young recently was also elected a director of the Southwestern Bell Telephone Company, of St. Louis.

Fred S. McConnell, for many years vice president of the Enos Coal Mining Company, has been elected president of the company, succeeding the late **George Enos.**

R. D. Lauder has been appointed assistant to the superintendent of the Crescent Mine of the Pittsburgh Coal Company at California, Pa. Mr. Lauder was formerly employed in the office of Assistant Production Manager **John D. Clark.**

Edwin H. Crabtree, Jr., a former metallurgist for the Eagle Picher Mining and Smelting Company, of Joplin, Mo., has joined the staff of the University of Arizona. He is in charge of an ore testing service for the state.

T. E. Jenkins, president of the National Fuel Company, of Denver, Colo., has been elected president and chairman of Northern Colorado Coals, Inc., for the fourth consecutive time.

H. N. Eavenson, Pittsburgh mining engineer, has been appointed as one of the receivers of the Elk Horn Coal Corporation.

Grant Stauffer was elected president of the Associated Industries of Missouri at a meeting of the Board of Governors held in St. Louis on December 5. Mr. Stauffer is president of the Sinclair Coal Company and a director of the American Mining Congress.

Miles F. McDonald has been elected vice president of the Butte Copper and Zinc Company, Butte, Mont., succeeding **A. L. Bailey**, deceased.

Stephen E. Quayle and **Walter E. Dewald**, both of Iron River, Mich., have been appointed general superintendent and chief mining engineer, respectively, of Michigan operations of the M. A. Hanna Company.

D. S. Kingery has been transferred from the Standards Department of the Pittsburgh Coal Company to the assistant superintendency of Somers Mine at Pricedale, Pa.

Donald A. Robison has been made a vice president of the Caterpillar Tractor Company, with administrative direction of all selling and advertising activities. The office of general sales manager, which Mr. Robison leaves to assume his higher duties and responsibilities, is being filled by the advancement of **Gail E. Spain**, who was formerly manager of the sales development division.

Pittsburgh Coal Company have made several changes in personnel, as follows:

John J. Vinton transferred from assistant to the superintendent at Westland mine to superintendent at Westland mine, effective December 16, 1940.

John Alderson transferred from mine foreman at Westland mine to assistant to the superintendent at Westland mine, effective December 16, 1940.

R. D. Cullen transferred from the product control department to production scheduler, effective December 16, 1940.

Frank E. Mueller has been elected president of the Roberts and Schaefer Company, Chicago, effective January 1, 1941. Mr. Mueller was formerly vice president.

Errol MacBoyle, executive vice president of the Idaho-Maryland Mines Corporation, was made chairman of the California State Mining Board at a recent meeting in Sacramento.

Alfred S. Utton has been named advertising manager of the Robins Conveying Belt Company. He will be assisted by **E. E. Riches** and **John M. Lupton.**

H. Eugene Mauck, formerly face preparation inspector of the Pittsburgh Coal Company, has been appointed assistant to Assistant Production Manager **John Bartram.**

Max H. Barber, of Hibbing, Minn., former district superintendent on the Mesabi Range for the Cleveland-Cliffs Iron Company, has been elected vice-president in charge of operations of the company, succeeding **A. C. Brown**, of Cleveland, first vice president, who has been placed in charge of sales of all commodities and services.

M. M. Haley has succeeded J. C. Elmore as chief engineer of the Block Coal & Coke Company. His headquarters are Block, Campbell County, Tenn.

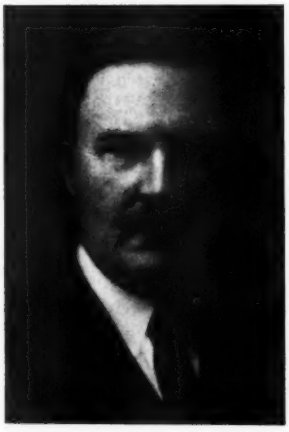
Russell C. Fish, of Iron River, Mich., has been named general superintendent of Minnesota operations of the M. A. Hanna Company, succeeding **William E. Craig.** He is located at Hibbing, Minn.

George W. Curtis has been appointed Milwaukee division manager of the Timken Roller Bearing Company. Industrial and automotive bearing sales as well as alloy steel sales activities of this division will be under his supervision.

W. K. Hanna has been appointed manager of the Pittsburgh territory for the John A. Roebling's Sons Company. He was formerly assistant manager of the Philadelphia branch. His new territory embraces western Pennsylvania, Maryland, Virginia, West Virginia and Kentucky.

—*Obituaries*—

Stephen Birch, founder and chairman of the board of the Kennecott Copper Corporation, died in New York on December 29, at the age of 68.



Mr. Birch had a long and distinguished career as a mining engineer and financier, principally identified with the development of modern large-scale copper mining practice. After graduation from Columbia School of Mines in 1898 he went to Alaska to examine properties for H. O. Havemeyer and while there was one of a group of five who were the first white persons to explore the area between Valdez and the Yukon River and Dawson. As a result of these explorations, the Morgan-Guggenheim Syndicate built the Copper River and Northwestern Railroad, developed the Kennecott mine and formed fishing, banking and steamship companies in or near the area.

In 1915 the Kennecott Copper Company, with Mr. Birch at the head, was formed in a merger of some of the Syndicate's interests. The Alaska operations were dropped in 1938, but in the meantime the company had become the largest copper producing concern in America, with a capacity of 1,000,000,000 pounds of copper annually at mines in Utah, Nevada, Arizona, New Mexico and Chile. All mining men are familiar with the spectacular success of some of these operations, notably the Utah Copper Company at Bingham Canyon, and the Braden Copper Company in Chile.

Mr. Birch was also chairman of the board of the Braden Copper Company and president of the Alaska Steamship Company and the Copper River and Northwestern Railroad. He was a director of the Alaska Development and Mineral Company, the Bankers Trust Company, the Utah Copper Company and several railroads in the Northwest.

He lived at Rahway, N. J. He is survived by a son and daughter, Stephen Birch, Jr., and Miss Mary Birch; a brother, John Harvey Birch of New York, and two sisters, Miss Emily M. Birch of New York and Mrs. R. E. Meier of Glen Rock, N. J.

His loss will be keenly felt by his wide circle of friends and associates. The mining industry has lost one of the giants of the era.

Fred R. Davis, a founder of the Audit Bureau of Circulation, and for many years an advertising space buyer for the General Electric Company, died at his home in Schenectady on December 26 at the age of 64, after an illness of two years. Mr. Davis had served the General Electric Company continuously since 1905 and was well known in advertising circles. In 1922-1927 he was third vice president of the Audit Bureau of Circulations, and from 1927-1934 was first vice president of the same organization. He was a member of the Technical Publicity Association of New York and of the Schenectady Press Club.

Fred A. Jordan, a mining engineer and official of the Youngstown Sheet and Tube Company, died December 14 at Youngstown, Ohio, aged 68. For many years his work had been in connection with the production of raw materials, chiefly at the Nemacolin mine of the Buckeye Coal Company. He took an interested and helpful part in Mining Congress affairs. He will be missed by a wide circle of friends and associates.

Edward D. Hutchinson, 78, president of Kennedy Mining and Milling Company, San Francisco, died in San Francisco, following a heart attack. He had been associated with the company for 41 years.

Nicholas Christensen, age 59, sales manager of the Mining Division of Cardox Corporation of Chicago and widely known in the coal mining field, died December 26, at Rochester, Minn., after a serious illness. He had a long career in the sales field, handling a diversity of products ranging from aircraft to baking powder, during the later years of which he devoted all of his time to the sales and promotion of the Cardox non-explosive mining method.

John Cliffe Wilson, manager of the mining sales department, a director of the Ohio Brass Company, and nationally known throughout the coal industry, died at Mansfield General Hospital, December 18, after an illness of several days.

Mr. Wilson had been in ill health for some time, but had been at his office until a few days before his death.

He had been identified with the Ohio Brass Company for the past 35 years, having come there in the production department. Later he was made assistant office manager and in 1912 became head of the mining sales department. In this capacity he became known to mining men all over the country.

In 1923 he was one of the organizers of the Manufacturers Division of the American Mining Congress and has served as chairman of the Board of Governors on numerous occasions since then. He was a member of the board of the Manufacturers Division at the time of his death.

Mr. Wilson was a native of Sidney, Ohio. His parents were Henry Clay and Isabelle Wright Wilson. After graduating from high school in that city, he attended Ohio Northern University.

He came to Mansfield in 1905, and in 1910 married Miss Janet Weaver, of Erie, Pa.

In his youth he had served in the Spanish-American War, in Company L, Third Ohio Regiment, under Col. W. P. Amos, of Sidney.

He was a member of the Mansfield Chamber of Commerce, several Masonic bodies, including Knights Templar, and was a past master of Temperance Lodge, F. and A. M., of Sidney. He was also a member of the Illinois Mining Institute. He was a charter member of the Our Club, and Westbrook Country Club, of Mansfield.

He is survived by his wife and three children—Jane, John, Jr., and Richard.

Carl Barth, Jr., field engineer for the Arizona Department of Mineral Resources, died at the Methodist Hospital, Philadelphia, Pa., as the result of a 20-foot fall suffered there. He had been at the hospital for treatment for a nervous disorder. Barth, who was born in 1884, graduated with a degree of engineer of mines from Lehigh University in 1908 and has been connected with numerous mining enterprises throughout the United States and Canada.

NEWS and VIEWS

Sayers Stresses Co-operative Nature of Bureau Service

Dr. R. R. Sayers, director of the Bureau of Mines, United States Department of the Interior, in an address at the annual dinner of the Coal Mining Institute of America in Pittsburgh, Pa., December 12, 1940, called upon leaders of the industry to make coal mining a more healthful and safer occupation.

Characterizing the 1940 major disaster record in coal mines, which took a toll of 267 lives, as the blackest in 12 years, Dr. Sayers asked the coal-mine operators and officials what assurances they can have that similar catastrophes will not continue to occur. The industry, he said, was not taking full advantage of findings of scientific research and investigations into safety.

"The Bureau of Mines has no regulatory or police powers, Dr. Sayers declared. "Its work is of an investigative and educational nature, and it must rely upon the cooperation of the various mining departments and the mining industry to make its findings effective in the betterment of conditions."

After pointing out that coal mining is carried on in more states, provides more freight, furnishes more power, and gives employment to more men than any other branch of the mineral industries or any single manufacturing industry, the Bureau of Mines director described more than a dozen major activities of the Bureau which benefit the industry. He listed them as follows:

1. Testing and approval of mining equipment.
2. Testing and approval of explosives and blasting devices.
3. Testing and approval of oxygen breathing apparatus, gas masks, hose masks, and dust respirators.
4. Studies and tests of the explosibility of coal dust and research into the use of rock dust to prevent or limit propagation of mine explosions.
5. Analysis of coal purchased by the Government and of coal and coal-dust samples collected by Bureau engineers.
6. Studies of methods, practices, costs of mining and studies of ventilation, transportation and conditions in mines.
7. Studies of air and dust conditions likely to affect the health of miners.
8. Studies in the utilization, carbonization, and hydrogenation of coal.
9. Collection, preparation, publication, and dissemination of information.
10. Assistance, investigations, and reports following mine disasters.
11. Safety inspections and reports.
12. Assistance to state mining departments, state inspectors, operating officials, and mine workers.
13. Safety educational work, including the distribution of motion pictures and photographs.

Coal mining can be a safe industry, Dr. Sayers asserted, but can be made so only by the joint efforts of all who have a stake in that industry and an interest in a safe and prosperous America. The Bureau's activities, and particularly the safety work, have been handicapped for many years because of insufficient funds and personnel, he said; nevertheless, it will continue, as directed by Congress, to promote as ably as it can the orderly development of the mineral industries and the health and safety of the workers employed therein.

Stemming in Metal Mines

The effect of stemming on gases generated by blasting in metal mines, giving results of experimental work conducted at the testing adit of the Bureau of Mines at Mt. Weather, Va., is discussed in a report just issued by the Bureau. This is the second publication in the series pertaining to investigation of stemming at the Mt. Weather testing adit. The first report dealt with dust produced from blasting.

Final conclusions on the use or nonuse of stemming at Mt. Weather testing adit cannot be reached until the completion of the studies of all three phases of the investigation, viz., dust, gas, and efficiency.

With respect to gases, carbon monoxide and oxides of nitrogen were the principal toxic products formed in these tests. The results from 61 rounds using one particular brand of 60 percent ammonia gelatin dynamite having oxygen balances ranging from minus 0.56 to plus 1.34 showed no appreciable difference in the amount of carbon monoxide produced when using clay stemming in two paper cartridges, ceramic blasting plugs plus two paper cartridges of clay, or sand stemming in two paper cartridges, as compared with no stemming.

Combustible blasting plugs and safety primers encased in wood approximately doubled the amount of carbon monoxide after blasting as compared with the several types of stemming under investigation.

The use of hydrated line as stemming reduced the amount of carbon monoxide after blasting as compared with the other types of stemming and with no stemming.

The amount of oxides of nitrogen after blasting was virtually the same with all types of stemming, including no stemming.

A decrease in the percentage of break of a round showed a trend toward an increased amount of carbon monoxide plus methane and an increased rise in the temperature of the gases formed by blasting.

Four-ft. rounds were drilled by the same machine in one heading in a fairly uniform basalt. All rounds were exact duplicates with the same burden on each corresponding hole in succeeding rounds. The blast was detonated by delay electric blasting caps of No. 6 strength from current furnished by a blasting machine.

To confine the dust and gases after blasting, a tight brattice frame was erected in the adit at a distance of about 60 ft. from the face. When the heading had advanced a maximum of 80 ft., a new brattice was erected. Within one minute after the last shot in a round was fired and apparently before any gases or appreciable dust escaped, the brattice curtain was dropped and fastened in place.

Gas samples were taken by the vacuum bottle method and analyzed at the gas laboratory of the Bureau of Mines at Pittsburgh.

Gray Holds Coal Act Functioning Smoothly

Director Howard A. Gray of the Bituminous Coal Division, in a letter to Jesse V. Sullivan, Charleston, W. Va., secretary of the West Virginia Coal Association, claimed that the Coal Act is functioning smoothly after nearly two months of operation and is giving the coal industry the first real protection it has ever had.

According to Gray, coal production has returned to normal seasonal levels following a brief interruption of steady operation because of consumers' stocking in anticipation of price increases, and seasonal influences. The coal industry, he added, is rapidly settling down to rebuild itself into a financially sound and stable unit of the national economy, now that the burdens of demoralized marketing conditions have been removed by the Coal Act.

The Director pointed out that while the 60-day period has passed in which the law permits persons to ask the United States Circuit Courts of Appeals to review the Division's determi-

nation in the general price-fixing proceeding, only three court cases were filed, although more than 13,000 producers and the hundreds of thousands of consumers were affected by the minimum prices. Only one of these cases attacked any fundamental features of the minimum prices, while the other two were limited to specific prices for specific mines. None of them attacked the fairness of the Division's procedure.

The letter was in answer to a charge by Sullivan that the minimum prices, which became effective on October 1, 1940, caused Pennsylvania producers to gain business at the expense of producers in West Virginia, Ohio, Kentucky and Illinois, which charge, the Director alleged, "utterly is without foundation." He asserted that an unbiased study of production statistics in the light of well-known circumstances in the coal industry conclusively disproves Mr. Sullivan's contentions.

Fourth Annual Power Conference Scheduled for Chicago in April

The 1941 meeting of the Midwest Power Conference will be held on Wednesday and Thursday, April 9 and 10, at the Palmer House, Chicago. This conference is sponsored annually by Illinois Institute of Technology, with the cooperation of seven other mid-Western universities and colleges and the local sections of the founder and other engineering societies.

The tentative program of the meeting includes sessions on "Central Station Practice," "Stationary Prime Movers and Plant Auxiliaries," "Hydro Power," "Electric Power Transmission and Distribution," "Feedwater Treatment" and "Industrial Power Plants."

The tentative program also consists of joint luncheons with the Chicago sections of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, an All-Engineers' dinner, an inspection trip and a smoker.

St. Louis Smelting Will Reopen Rico Properties

Office of the St. Louis Smelting and Refining Company at Rico, Colo., has received "go ahead" orders for the reopening of its St. Louis tunnel properties about a mile north of Rico, Daily Metal Trade reports. The St. Louis tunnel is the largest mining project in that section at the present time and was operated for a couple of years on a small scale. Metal markets at that time being unsatisfactory, it was decided to close the workings down about 18 months ago.

During the period of operations a vast amount of exploration and development work was done, and it is stated that many large bodies of ore have been blocked out and made ready for the drilling machines.

Beck Mining Company Operating Sunflower Mines

Beck Mining Company has taken over the operation of the mill and mines of the Sunflower Mining Company, Inc., a half-mile northeast of Hockerville in Kansas, according to an announcement by C. W. Nicolson of Miami, Okla., manager of the former company.

Mining and milling equipment of the Sunflower company, including 300-ton mill, was acquired outright through purchase by C. A. Beck of Miami, Okla., president of the Beck company. Mining leases acquired through the deal included the old Euterpe, on which the mill is situated; the old Peru, which adjoins on the east; the Thomas land to the south, and the Banning land south of the Peru, all of which are 40-acre tracts.

The old Peru and Euterpe mines were reopened by the Sunflower company the middle of 1937, at which time the mill was reconditioned throughout and operated up until a few months ago. Officers of the Sunflower company were Lee Thomas, president; H. H. Hartzell, vice president, and Howard Thomas, secretary-treasurer, all of Baxter Springs, Kans.

As much of the Peru and Euterpe ore bodies have been cut out, mine operations will be extended to virgin ground to the south by the Beck company, Nicolson said. Mining will be carried on about the 280-ft. level, just a few feet above the underground water-table. Operations will be carried on from a field shaft on the Peru, and a shaft south of the mill on the Euterpe will be opened later.

Mining and milling operations are under way, employing approximately 50 men. Dewey Simms of Baxter Springs, for many years superintendent of the Cortez-King Brand Mines Company, will be superintendent in charge of operations.

Prior to the resumption of operations at the mill, the plant was repaired, some changes were made in the jigging department, and a flotation machine was added to the float department.

Aluminum Company to Use More Bonneville power

A new contract between the Aluminum Company of America and the Bonneville Power Administration increases the power bought by the company by 97,500 kilowatts to a total of 172,500 kilowatts, or enough to produce 150,000,000 pounds of aluminum annually.

The contract announced by the Department of Commerce provides power for three new production units to be built at the company's Columbia River plant.

At the rate of $17.50 a year per kilowatt, the company will pay the Bonneville Power Administration about $3,000,000 annually, the Department said.

The Last Mile

In connection with the article this month on the Carlton Tunnel, it is interesting to note that the last mile is now being driven. On December 23, the crews began a three-day holiday to celebrate the completion of the first five miles of tunnel. All previous records for speed of driving have been broken repeatedly.

The bore will be finished this spring or early summer, over a year ahead of original calculations. The last mile will go more slowly because underground water may be tapped in the crater core, and the ground may be more broken.

Mine-Rescue Station Established in New York

A new mine-rescue station of the U. S. Bureau of Mines has been opened at Albany, N. Y. Offices are located in the Federal Building, and the station will serve the state of New York and the New England states.

Lester L. Naus, associate mining engineer, is in charge of the station and will be assisted by two safety instructors. A fully equipped mine-rescue truck has been assigned to the station.

An appropriation of $20,000 was made by the present Congress for the establishment and maintenance of the station. The need for a mine-rescue station to cover this general area is due to the extensive tunnel projects now under way in New York State and to the importance of the mining and quarrying operations in New York and in the New England states.

The personnel of the new safety station will instruct mine, tunnel, and quarry workers, and other employes in the mineral industries, in first-aid and safety methods and will give attention to various safety problems in connection with such industries. The area to be served by this station is part of regional District B of the Bureau of Mines, with headquarters at Wilkes-Barre, Pa., in charge of S. H. Ash, district engineer. The personnel will cooperate with the New York State Departments concerned with health and safety in the mineral industries in the endeavor to bring about safer conditions in the area to be served.

WANTED

Sales Engineer with record of accomplishment in selling coal preparation and cleaning equipment to mine operators east of the Mississippi. Give age, education, experience and salary expected in first letter. Apply Box MCJ, 309 Munsey Bldg., Washington, D. C.

Northwest Mining Association Holds 46th Annual Convention

The 46th annual convention of the Northwest Mining Association was held in Spokane, Wash., December 5-7, 1940, and was attended by over 500 mining men.

Chief topics of the three-day session included discussions of marginal mines, accident prevention, equipment developments, public land policies, geology, minerals and national defense, federal taxation, silicosis, and prospective mine legislation.

Resolutions were adopted favoring a monetary system based upon gold and silver, the establishment of a federal department of mines, the Walter-Logan bill, amendment of the reciprocal trade agreement act to exclude any domestically mined metals which are sufficient to meet United States needs, simplification of SEC procedure, modification of the wage-hour law to provide more equitably for the convenience of employes in isolated areas, and encouragement of the establishment of new industries in the Pacific northwest. The convention went on record as opposing further mineral land withdrawals, creation of additional or expansion of present national parks and creation of any "TVA" in the northwest. Donald A. Callahan of Wallace, Idaho, was chairman of the convention's resolutions committee.

C. O. Dunlop, president of the association, opened the convention at a luncheon at noon Thursday, December 5, 1940. He declared that the nation "for the first time in 25 years is in an era of false prosperity" and charged that the country "is borrowing on its future income and spending it on machines of destruction."

J. Richard Brown chairmaned the initial business session, at which the following addresses were presented: "Marginal Mines," by John H. Eby, mining engineer; "Recent Developments in High Speed Diamond Drills for Blast Hole Drilling," by R. T. Banks, of the Sullivan Machinery Co., Salt Lake City; and "Present National Park Expansion Policy," by Miller Freeman, Miller Freeman Publications, Seattle.

Eby praised old-time results in marginal operations. "The old-timers specialized in marginal operations and you have to take your hats off to their unbelievable accomplishments when we consider their lack of labor-saving machinery, high transportation cost, and no flotation concentration," he said.

He recalled the days when single-jacking was the art and how thorough the old-time miners worked their properties and how little value much of the tailings carried. With the proper handling of marginal properties production can be increased, he stated.

Robert T. Banks spoke of research work in connection with high-speed diamond drilling for drifting, stoping and cross-cutting.

At the Friday morning session, L. K. Requa, of the Idaho Almaden Mines Company, Weiser, Idaho, addressed the session on "The Geology and Operation of the Idaho Almaden Mine." "Quicksilver mining is unique for the ore does not occur in veins but in large deposits," Mr. Requa said. "It usually is not necessary to invest huge sums in the mining operations nor in the plants.

"Our mill cost about $30,000 outside of other equipment. It is a Gould rotary and has handled about 30,000 tons for us in the last year and a half. We are treating 50 tons a day, giving us a return of 4 to 12½ pounds with an average of 7½ pounds to the ton. It is profitable. The United States Bureau of Mines credits our company with being the seventh largest quicksilver operation in the United States."

Other speakers at the session were Ivan Bloch, chief of the market development section, Bonneville Power Project, Portland, Oreg., who spoke on "Normal and National Defense Considerations of Northwest Resources," and Dr. Francis Thomson, president, Montana School of Mines, Butte, who discussed "Strategic Minerals in Montana."

Bloch proposed a three-point development plan for the Northwest to follow in cooperating with the preparedness program.

"It is my belief," he asserted, "that the contribution of the Northwest and the West to the national defense has been overshadowed by the needs and desires of the East. Certainly, one contribution to the national program is in the contributions we can make to our own west coast defense."

"To implement the Northwest's contribution to the national defense," Bloch proposed: '(1) To impress upon ourselves and the nation that our contributions are not only in supplying of raw materials—essential, critical,

CONSCRIPTED

--CHARLESTON DAILY MAIL

and strategic—but in their regional manufacture into important products. Moreover, these industries are a part of our long-range development and should be so viewed. (2) To impress upon ourselves and the nation that our contributions can only remain effective through the strengthening of our coastal defense program by the development of our own war industries, and that we ask not so much for special dispensations, but for sincere recognition of our problems and of our assets. (3) To impress upon ourselves and the nation that our contributions can be expanded—on short as well as on long-term basis—by the institution and implementation of coordination in our industrial activities and in programs of research on our resources."

Dr. Francis Thomson spoke interestingly of the vast deposit of chromite in Montana under research in connection with the quest for strategic metals, in addition to a review of the big part his state is playing in the production of manganese, on the strategic list. He told of the stockpile of more than 200,000 tons the Anaconda Copper Mining Company has started and extensive plant construction to provide concentration and sintering of the pink variety of manganese.

At a luncheon session Friday, J. B. Haffner, general manager, Bunker Hill and Sullivan Mining & Concentrating Co., Kellogg, Idaho, presented the highlight speech of the day on "The Present Situation in Base Metals." Mr. Haffner declared that observers who usually have the facts straight have recently advised that the price of lead was under close observation by the price division of the National Defense Commission, and that the industry might soon be put on the carpet.

"It has even been suggested that unless there was some revision downward the government might make the lead industry an example of what it can do to control industry. It also has been charged that consumers have laid in an extra supply of lead and therefore the market has dried up during the last few weeks." In answer to this charge, Mr. Haffner said that, in his opinion, "the war has brought about an accumulation in this country of large so-called 'buffer stocks' of fine lead. Prior to the present war our imports and exports of lead were practically in balance. During this year, however, the imports have materially exceeded the exports.

"During the first nine months of this year, 130,000 tons of bonded lead have been imported into this country while exports were only about 20,000. The balance of 110,000 tons of buffer tonnage is awaiting a favorable opportunity to be sold over our tariff wall."

The zinc situation is rather acute, Mr. Haffner said, this being due to the fact the bottleneck is the smelting and refining capacity. He reviewed the prices over a period of years, referring to 1937, when the price of zinc went as high as 7.38 cents.

"The industrial revival of that year," he said, "was not permitted to last long; it apparently did not fit into the picture which the administration wanted."

He also referred to the opposition of the zinc industry to the reciprocal trade agreement which reduced the tariff on zinc 20 percent, and the price of zinc ½ cent a pound.

"The immediate outlook for copper," he said, "and zinc is good, as there is no serious threat from cheap foreign metals. The outlook for lead is not so good, although there has been a good demand for it, and this demand will probably continue."

At the Friday afternoon session, December 6, 1940, strategic minerals was the subject of open discussion. Dr. Harold E. Culver, supervisor, division of geology, Pullman, Wash., spoke on the "Progress of the Washington Division of Geology in 1940 with Emphasis on the Work Done in the Search for Strategic Minerals." S. H. Lorain, U. S. Bureau of Mines, Moscow, Idaho, described the work of the U. S. Bureau of Mines in search for strategic minerals in the Northwest.

On Saturday morning, December 7, with Donald A. Callahan, of Wallace, Idaho, acting as chairman, Leo J. Hoban, secretary of the Hecla Mining Company, attacked the federal excess profits tax law and urged mining men to communicate their views to their representatives in Washington. His paper appears on pages 45 to 48 of this issue.

Other speakers at the day's sessions were Dr. Max Smith, of Wallace, Idaho, who spoke on "Idaho Silicosis Law and What the Medical Profession in the Coeur d'Alene District Does in Cooperation with the Mining Companies," and an address at a luncheon session by Compton I. White, Member of Congress from Idaho. Representative White spoke on "Prospective Mine Legislation in the Next Congress." He told the Association that the mining industry was "forgotten, spurned and neglected like some fallen Gulliver tied and hedged about with webs of thread spun by bureaucratic control."

He asked establishment of a federal division of mining.

White urged modification of the "drastic rules" of the Securities and Exchange Commission and government construction of mining roads over federal land as stimulants to the industry.

"Your western representatives in the Senate and House have a tremendous task to rescue the West and its mining industry from the restraining hands of bureaucratic control," he declared.

"We should use our influence to change the present trend of policy of our federal government in dealing with development of the mining industry and assist in reestablishing the broad, constructive policy that has contributed in such a big way to our industrial development."

Bureau of Mines Reports Last Quarter Position of Copper

Available supplies of copper for the last quarter of 1940 exceed consumers' requirements for the same period by 81,000 short tons, according to a telegraphic survey recently completed by the U. S. Bureau of Mines. The canvass indicated that fabricators' requirements for refined copper for domestic and foreign trade were expected to total 361,000 tons during the three-month period, whereas the available supply aggregated 442,000 tons. Of the 64 concerns reporting, 13 indicated shortages. Anticipated requirements of this group totaled 62,100 tons against an available supply of 49,700 tons.

Consumers were requested to supply total physical stocks of domestic and foreign refined copper at and in transit to consumers' plants, copper owned by consumers and stored at producers' plants, other forward purchases as of September 30 for which delivery is certain during the last three months of 1940, total consumption in September and anticipated requirements for the last quarter of 1940 for domestic consumption and for export. The data include all foreign copper regardless of whether or not it is "duty free" and are thus not strictly comparable with consumption and stock figures released monthly in the trade.

College of Mines, University of Washington, Announces 1941 Mining Institute

The College of Mines, University of Washington, Seattle, has announced that the 14th Annual Mining Institute will be held during the week of January 20 to 25, 1941. Attendance in 1940 was 325. Meetings are scheduled on the University campus each day, including a field trip to some plant of mining or metallurgical interest. Members of the College of Mines staff will give lectures or laboratory demonstrations covering the fields of mining, metallurgy and ceramics. New equipment and machinery will be exhibited, and motion pictures of current operations will be shown. In addition, operators and engineers will describe and illustrate the activities in their fields.

PETER F. LOFTUS

Consulting Engineers

ENGINEERING AND ECONOMIC SURVEYS, ANALYSES AND REPORTS ON POWER APPLICATIONS AND POWER COST PROBLEMS OF THE COAL MINING INDUSTRY

Oliver Building **Pittsburgh, Pa.**

New Educational Motion-Picture Films Tell Story of Lead Mining, Milling, Smelting, and Refining

The mining, milling, smelting, and refining of lead are interestingly portrayed in two recent additions to the educational film library of the U. S. Bureau of Mines. The films, which were prepared in cooperation with one of the large lead companies, each require about 30 minutes for projection and are available only in "sound."

The first picture, "Lead Mining in Southeast Missouri," opens with animated drawings that show the location and geologic features of the southeast Missouri lead belt, where the most extensive lead-mining operations in the United States are conducted. These are followed by scenes which re-enact historical pick-and-shovel methods of mining and the operation of a Scotch-hearth type of furnace used in early smelting operations. After a portrayal of the development of diamond drilling in the region, scenes of present-day methods, fully described by narration, show a shift of miners being lowered in the shaft to the working level and then transported to the working face; the operations of drilling, blasting, loading with dynamite, and firing the charges in a development drift; electrically operated underground loading of the broken rock; and its transportation to the waste dump. Ensuing scenes show underground pumps, which force the collected seepage water to the surface, an underground power station, machine shops, and a theater with miners assembled for a safety lecture. These are followed by scenes which show removal of ore from a stope, including drilling, firing a dynamite charge, an electric shovel and a dry scraper loading ore, several impressive views showing the magnitude of the underground workings, transportation of ore to the shaft, automatic weighing and dumping ore cars at the shaft pocket, hoisting, and dumping at the surface. The picture ends with views of a safety meeting and some of the features of community life in the region.

The second picture, "Lead Milling, Smelting, and Refining," depicts the steps and processes for converting the mined lead ore into useful and marketable products. The ore is coarsely crushed, weighed and sampled, and conveyed to storage bins at the top of the mill. When drawn from the bins the ore is screened, ground in rod mills, classified, and separated on shaking tables into concentrates, middlings, and tailings. The middlings are returned to the grinding circuit; the tailings are dewatered by "chat drags" and sent to tailing ponds; and the concentrates are dewatered by rotating vacuum filters and started on their way to the smelter. The slimes from the chat drags are thickened and sent to pneumatic flotation machines, where chemicals are added to make particles of the ore come to the top with the froth created by jets of compressed air in the flotation tanks. The lead-bearing froth is cleaned, dewatered by vacuum filters, dried in a gas-fired drier, and loaded into box cars shipment to the smelter. At the smelter the concentrates from the tables and the flotation machines, after sampling for assay, are mixed and sent to a sintering machine in which part of the sulphur is burned, leaving a porous cake or clinker. This is crushed and resintered, reducing the sulphur to about 3 percent. The final sinter is mixed with coke and slag and charged into blast furnaces, which are operated continuously in three eight-hour shifts, seven days a week. Waste gases from the blast furnaces are conducted to a bag house where any lead products are filtered out. In the blast furnace, the heavy lead metallics and heavy matte settled to the bottom, while the lighter slag rises to the top and is tapped off periodically. Matte is tapped from the bottom and granulated by pouring it into a high-pressure water stream. The molten lead is also tapped off at the bottom of the blast furnace, and after a preliminary skimming of the dross, is sent to the refinery, where silver is recovered and the remaining lead is cast on a rotating casting wheel into 100-pound pigs, which are loaded for shipment to the market. The picture concludes with scenes portraying some of the familiar uses of lead and lead products, which play such an important part in modern life.

New Mining Institute Formed

A new mining institute was recently organized at Mullens, W. Va., and is known as the Wyoming-Pocahontas Coal Mining Institute. James B. Benson, Glen Rogers, was named president and Floyd H. Houck, of Mullens, secretary. Vice presidents are W. L. Johnson, Glen Rogers; W. F. Cook, Wyco; C. R. Bourland, Kopperston; T. R. Blankenship, Alpoca; and Earl McCoy, Stephenson.

Elton Tunnel Makes Progress

The Elton Tunnel stood at 19,355 feet on November 16. Officials reported the faulted ground had apparently been passed, with present digging being in quartzite.

When completed, the tunnel, being driven by the National Tunnel & Mine Co., will stretch 24,300 feet from Tooele Valley to upper Bingham mining property. The tunnel will be used to drain deep levels of these mines and also for transportation of miners from Tooele. The tunnel was started during March, 1937. Work has been interrupted twice. Completion of the million dollar project will be accomplished in March or April at the present rate.

Sinking of No. 2 Blue Goose Finished

Eagle-Picher Mining and Smelting Company has completed the sinking of the No. 2 Blue Goose shaft, midway between the company's Southside and See Sah mines, south of Cardin, according to G. C. Niday, of Miami, tri-state manager of the company.

The new shaft, which is 5 by 7 feet in the clear, was sunk to the 325-foot level. In addition to double cribbing, the walls of the shaft were supported by reinforced concrete down to hard rock.

Sinking derrick over the shaft is being replaced by the old Netta mine shaft steel headframe, which was installed a few years ago at the D., C. & E. mine in the Oronogo bottoms. A large steel hopper of about 600-ton capacity, formerly used by the Commerce Mining and Royalty Company at the West Side mine north of Picher in Kansas, has been dismantled in sections and is being rebuilt in connection with the head-frame. Skips to be used have a capacity of more than two tons of ore rock.

A railroad spur from the Central mill trackage has been completed to the See Sah No. 3 field shaft, the derrick and hopper of which have been raised about 6 feet to facilitate the direct loading of ore rock into railroad cars. A branch spur will be built to the Blue Goose No. 3. The total trackage laid will approximate 5,800 feet.

Inauguration of mining operations at the new development in the near future will afford a new outlet for handling increased tonnages of ores mined from the sheet-ground formation of the immediate area.

American Sources Supply 98 Per Cent of Electrical Industry's Raw Materials

Less than 2 percent of the raw materials needed for manufacture of electrical equipment now must be brought from abroad, according to a recent report by Andrew H. Phelps, general manager of purchases and traffic, Westinghouse Electric & Manufacturing Company. Progress in finding American sources or substitutes, he said, has made it possible to reduce imports to a few essentials, of which ample supplies are on hand.

As an example, the Westinghouse company annually buys about $100,000,000 worth of raw materials, finished parts, fuels, transportation and services. Every state in the union now helps to supply these essentials for electrical manufacture. Only about $2,000,000 goes for materials produced abroad, and in many cases even these are processed in the United States.

Principal items that must be imported include cobalt, antimony, Chile copper, Kanthal, mercury, nickel, tin, copal gum, white and amber mica, shellac, Japan paper, varnish-treated silk cloth, asbestos twine, and various hemp and long-fiber cotton twines and tapes, tungsten and China wood oil. All but nickel (Canada), mercury (Mexico), Chile copper (Chile), and antimony (Mexico), come from sources outside the Western Hemisphere.

Supplies of all these necessary materials appear to be ample for several months to come. Westinghouse has on hand sufficient amounts of the vari-

ous items to last from 10 to 36 months at the present rate of demand, and no particular difficulty in obtaining additional supplies is anticipated.

If the preparedness program greatly increases the demand, however, the prices of these materials may be considerably increased.

C. & O. Issues New Mine Directory

The Chesapeake & Ohio Railway has just issued a new coal mine directory, containing a complete list of the mines located on that line. The directory also contains many maps and pictures which show scenes along the line of the C. & O. system. The directory also contains a complete list of the sales agents handling the product mined along the Chesapeake & Ohio Railway, as well as a statement showing the coal loadings on that road from 1902 to January 1, 1940. In 1902 a total of 41,164,260 tons were shipped over the C. & O. lines. This tonnage had grown to a total of 42,310,115 tons for the year ending 1939. The book may be obtained free of cost from George H. Reinbrecht, 2912 Terminal Tower, Cleveland, Ohio.

Pickands, Mather to Operate Nine Underground Mines

Pickands, Mather & Co. will operate four underground iron mines on the Gogebic Range of Michigan, three in the Iron River area of the Menominee Range, Michigan, and two in Minnesota, one on the Vermilion and one on the Mesabi Range. The one on the Mesabi is the Bennett, which is developed for operation both underground and open pit. The same crew that manned the Bennett open pit during the shipping season will take hold in the underground department for the winter. This company's plans for the winter, like those of the other Lake Superior mining companies, are not yet completely formulated.

U. S. Smelting Acquires Alaska Gold Dredging Holdings

Announcement was made by the United States Smelting, Refining & Mining Co. of the acquisition by it of the properties on Chicken Creek and the Mosquito Fork of the Fortymile River, formerly owned and operated by Alaska Gold Dredging Corporation.

Chicken Creek, on which part of the properties are located, was discovered before the Fairbanks district and it has been steadily producing ever since its discovery. Until 1936 production all came from underground drift mining.

In 1936 H. D. Cowden organized the Alaska Gold Dredging Corporation and acquired a considerable amount of property on Chicken Creek and Mosquito Fork and constructed a dredge at a point about two miles below the mouth of Chicken Creek.

In the fall of 1939 the United States Smelting, Refining & Mining Co. took an option on the property and has had a prospect drill working there during the past year. Final payments have recently been completed on the dredge and other property and options taken on several other groups of claims.

No plans have been announced by the company regarding the date of resuming operations or the extent of its plans.

Mineral Resources Survey of Montana Extended Another Year

The statewide Mineral Resources Survey of Montana has been extended for another year.

The project has headquarters at and is being sponsored by the Montana School of Mines. Doctor Francis A. Thomson, president of the Montana School of Mines, is director for the sponsoring agency.

During the past year the Survey has published a new "Directory of Montana Mining Properties" and has been researching all the known literature on the mining industry of Montana. This literature is being abstracted and segregated by counties and districts. Besides having the information available by counties and districts, there will be published a "Bibliography of the Geology and Mineral Resources of the State of Montana," with indexes. The index of this publication will be very extended and thorough.

Field work is being carried on at some of the manganese and tungsten properties and this field work will be extended to cover chrome and antimony properties. The field work and the geological portion of the research and publications is being supervised by members of the faculty of the Montana School of Mines.

Records of all the patented mining claims in Montana and their owners were made from the county records last year. However, it was found that there were some errors, especially in location. The patented claim record is now being checked with the records in the office of the United States Cadastral Engineer at Helena, so that the proper survey number, mineral entry number, and location may be obtained from the original Government record and thus help to straighten out some of the county records. A number of other Montana mining records are being researched.

It is planned to compile and publish a 1941 supplement to the "Directory of Montana Mining Properties" hereinbefore mentioned.

When all the work, now planned, has been completed, it will be available to the public, either through publication or in the files of the Montana School of Mines. The work being done on the strategic and critical minerals is available to the Government as it is being carried on.

RESULTS AND SAVINGS

Clean Your Coal the R&S Way—

Whatever your preparation needs may be our engineers can find the proper answer

- **Coal Cleaning by Air Process**
- **Combination Wet and Dry Cleaning Plants**
- **Complete Coal Washing Plants**
- **Coal Dryers**
- **Dedusting Plants**
- **Coal Tipples**
- **Revolving Dumps**
- **Car Feeders**

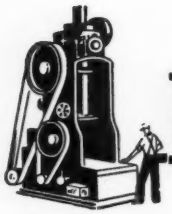
Write for Bulletin No. 153

ROBERTS AND SCHAEFER CO.

307 North Michigan Avenue Chicago, Illinois

P. O. Box 865, Pittsburgh, Pa.

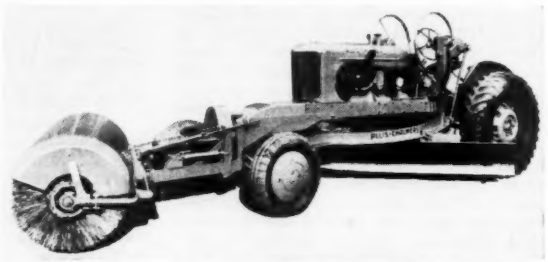
P. O. Box 570, Huntington, W. Va.



MANUFACTURERS' Forum

Low-Cost Motor Grader

The Allis-Chalmers W-Speed Patrol, a new low-cost motor grader, has many applications in coal stripping operations. It can be used to clean up after the stripping shovel by blading the remaining material into windrows for loading into trucks. Then with the sweeper attachment, which consists of a revolving broom sweeping a 72-in. swath, the coal can be swept clean. This saves money at the washing plant and eliminated hauling waste material.



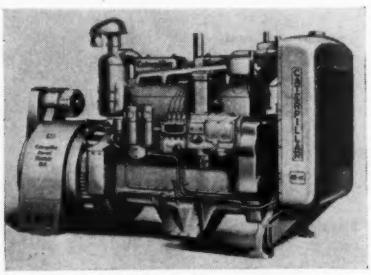
Mounted on rubber pneumatic tires, the W-Speed Patrol does not gouge or tear up the coal while working on it as do grouser shoes on tractors and shovels. Speeding up coal-stripping operations still further, this versatile machine is used to build and maintain hauling roads. With a smooth, well-maintained road, trucks speeds are increased and costs reduced.

The 120-in. wheelbase and short turning radius make maneuvering in close quarters easy. Operated by one man and burning about a gallon of gasoline per hour, this unit is most economical to operate. Offered by the Allis-Chalmers Manufacturing Company, Milwaukee, Wis., the W-Speed Patrol weighs 5,960 pounds and has 26 drawbar h.p. Standard equipment includes a 10-ft. moldboard, muffler, and electric starting and lights. A 9-tooth scarifier, ripping a 37-in. swath, is available mounted at the same points as the moldboard. The Hough Sweeper does not interfere with the performance and is easily attached or detached.

New Diesel Electric Sets

To round out its popular line of Diesel electric sets, Caterpillar Tractor Company has announced two new models, the 88-41 and the 77-34.

Both units are powered by four-cylinder Diesel engines. The 88-41, with a bore of 5¾-in. and an 8-in. stroke, develops 41 kw. at 900 r.p.m.,



when equipped with radiator fan. Without fan, kilowatt rating is 44.

The 77-34 has a bore and stroke of 5¼x8-in., and develops 34 kw. at the same r.p.m. when equipped with fan. It is rated at 36 kilowatts without fan. Both ratings are for the polyphase, 60-cycle set. Single phase ratings are slightly lower.

The sets are completely self-controlled, requiring no gadgets other than a circuit breaker. They are easy to install, and can be set up and running in less than an hour after delivery. Inbuilt regulation enables the sets to pick up relatively large motor loads with a minimum of light flicker and voltage drop.

Because of the wide application of these sets, maintenance problems have been simplified by having the entire unit serviced by "Caterpillar" distributors. They are designed to be operated by personnel without special training.

Improved Detachable Bit

Bulletin 87-G, just published by Sullivan Machinery Company, covers their improved detachable bits. These bits are designed so that a greater area of the cutting edges are located at the extreme outside diameter where they are most needed, providing broad chopping and reaming edges. The bits are made from electric furnace steel, forged, machined, heat treated and finished to exact gauge under automatic control to assure precision and uniformity. This provides a bit "that holds its gauge," resulting in smaller losses in gauge, fewer steel changes, fewer re-grinds, elimination of rifling in holes, no binding or catching of bits.

Center hole and side hole types. The rod, fitted with special rugged acme thread, bottoms into the bit so that the full force of the blow is not centered on the threads.

Bit gauges 1½ to 2¾ in. Rods: 2 ft. changes to 30 ft. Threading tools and detachable bit grinders also available.

New Plants Announced by R&S

Roberts and Schaefer Company, Chicago, Ill., announce contracts for the following plants:

Crozer Coal & Coke Company, Philadelphia, Pa., complete crusher installation for their mine at Elkhorn, W. Va., capacity 125 tons per hour for reducing lump coal to ⅝ x ¼ inch and ¼ x 0. Plant to be completed February 1, 1941.

Peerless Coal & Coke Company, Vivian, W. Va., complete crusher installation for crushing 3 x 0-in. coal at the rate of 325 tons per hour, provision being made to load ⅜ x ¾-in. pea coal and ⅜ x 0-in. slack. Plant to be completed February 1, 1941.

Page Coal & Coke Company, Philadelphia, Pa., complete crusher installation to be installed at their plant at Pageton, W. Va., for crushing run-of-mine egg and smaller sizes at the rate of 200 tons per hour to produce ⅝ x ¼-in. pea and ¼ x 0-in. slack coal. Plant to be completed February 1, 1941.

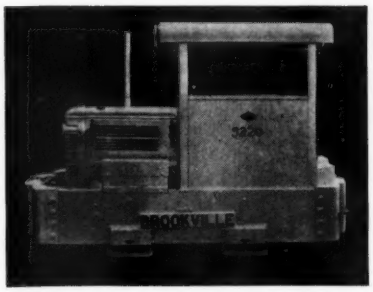
Morris Run Coal Mining Company, Wilkes-Barre, Pa., Stump Air-Flow coal cleaning units for their mine at Morris Run, Pa., for cleaning ¾ x 0-in. slack coal. Plant to be completed April 1, 1941. Capacity 100 tons per hour.

Island Creek Coal Company, Holden, W. Va., complete Stump Air-Flow coal cleaning plant to be installed at their mine No. 20 at Holden, W. Va., for cleaning ¼ x 0-in. slack coal, capacity 100 tons per hour. Fiant to be completed May 1.

New Brookville Locomotive with UD-6 International Diesel Engine

A new series of Brookville locomotives, in 4, 5 and 6 tons weight, is now available with the UD-6 International Diesel engine recently introduced by the International Harvester Company. This engine is a four-cylinder, four-stroke cycle, full Diesel, developing 39 hp. at 1,500 r.p.m.

As used in the Brookville locomo-



tive, the UD-6 Diesel engine makes an ideal locomotive power plant. Its high torque at slow speeds gives it the lugging ability of a steam engine. Its smooth flow of abundant power is applied efficiently to all four locomotive drive wheels through four forward and four reverse speeds, the latter of which are made available by the Brookville reverse gear operating in conjunction with a heavy duty, four-speed transmission. The work capacity of the locomotive is further increased by the use of steel tires, which increase traction by a full 25 percent over chilled face drive wheels.

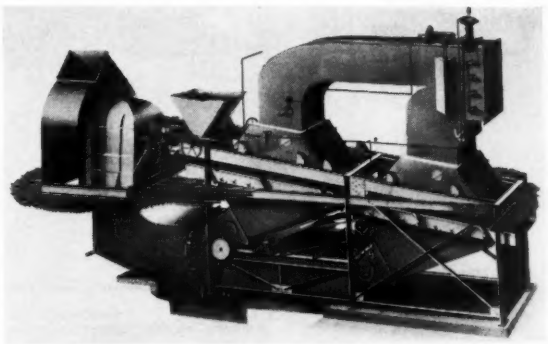
Other features of the Brookville locomotive include: dual spring journal suspension, which permits high speed over poor track; an indestructible steel frame; Timken bearings, and use of standard "International" parts in the engine clutch and transmission, to permit after sales field service by any International Harvester branch.

Available in any gauge, with or without cab, standard or mine types.

For literature send to the Brookville Locomotive Company, Brookville, Pa.

Coal Dryer

The McNally - Pittsburg Manufacturing Corp. of Chicago and Pittsburg, Kans., announce the redesigning of the McNally-Vissac Coal Dryer. Hot gases, tempered with atmospheric air are drawn at varying pressure through wet coal as it advances on a reciprocating screen. Moisture evaporation is accompanied by mechanical dewatering and amounts approaching 50 percent of the total moisture have been removed mechanically. Great savings in fuel and furnace requirements are then claimed and complete drying of the product is obtained at a lower temperature. Suction packing or matting of the fine wet coal is prevented by an ingenious feature—the patented pulsator; this pulsator breaks the hot gas column into pressure cycles and thus enables the coal to progress along the screen by relieving pressure at regular intervals. Provision is also made for cooling the dried product before it leaves the dryer.



New Ground Rail Clamp for Mining Locomotives

A modern ground rail clamp of either cast steel or 40-4 aluminum alloy construction for mine locomotives with double conductor cable reels, has been developed by the Westinghouse Electric & Manufacturing Company. An eccentric pin makes the clamp suitable for rail weights of 30 lbs. to 60 lbs. inclusive. The clamp body is a strong casting of such shape that a locomotive wheel can pass over it without danger of derailment or injury to clamp.

Known as the Type TA-20 Rail Clamp, additional information may be obtained from the Transportation Section, 2N, of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

CATALOGS AND BULLETINS

• AIR COMPRESSORS. *Chicago Pneumatic Tool Co.*, New York, N. Y. Bulletin 726 presents improvements and several detailed instructions of the company's two-stage compressors in capacities of 350 to 10,000 cubic feet per minute for pressures of 80 to 125 pounds. 30 pages.

• BEARINGS. *S K F Industries, Inc.*, Philadelphia, Pa. New 36-page catalog entitled "S K F Spherical Roller Bearings" illustrates roller bearing applications in mining and allied fields, and contains helpful information on bearing selection, time saving computations and bearing details.

• CAR TRANSFERS. *The American Mine Door Co.*, Canton, Ohio. New bulletin on the Canton car transfer cites the advantages of this equipment speeding up haulage operations by expediting the changing of cars at loading faces. 8 pages.

• CRUSHERS. *Traylor Engineering & Mfg. Co.*, Allentown, Pa. Circular 1005 explains the construction and design of the company's non-chokable bell heads and curved concaves in reduction crushers. 4 pages.

• ELECTRICAL EQUIPMENT. *General Electric Co.*, Schenectady, N. Y. Bulletin GEA-2963B describes and illustrates company Type TSA-14 time switches for automatic control of exhaust fans, pumps, blowers and many other industrial processes. 4 pages.

Bulletin GEA-3459 describes the G-E low vein locomotive—15 tons and only 26 inches high—equipped with high-torque motors, 10-step electropneumatic controller, double-reduction gearing, air-raised trolley base and hand and air brakes. 4 pages.

Bulletin GEA-2165A on the FK-142 oil circuit breaker for the severe duty of full-voltage motor starting, with information on construction features, wiring diagrams and available ratings. 4 pages.

Bulletin 3191 describes a-c magnetic control for wound-rotor motors developed for various material-handling machines. 4 pages.

Bulletin GEA-3020A on the company's new electrostatic voltmeter, featuring a unique design utilizing a light beam pointer and magnetic damping which gives this portable instrument a performance approaching that of conventional types of indicating instruments. 4 pages.

John A. Roebling's Sons Co., Trenton, N. J. Booklet describing rubber insulated electric wires and service entrance cables, their construction and uses. Also complete table of characteristics. 34 pages.

Roller-Smith Co., Bethlehem, Pa. Catalog 3630, illustrating and describing outdoor oil circuit breakers of 7,500-volt rating and 50,000 KVA interrupting capacity. 7 pages.

Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa. Bulletin describing a recently announced automatic switchgear for synchronous converter substations in mining service. 8 pages. Ask for descriptive data 31-330.

Bulletin listing and describing various types and shapes of transmission line fittings suitable for use on all classes of service for copper, A. C. S. R., and composite conductors. 8 pages. Ask for descriptive data 30-350.

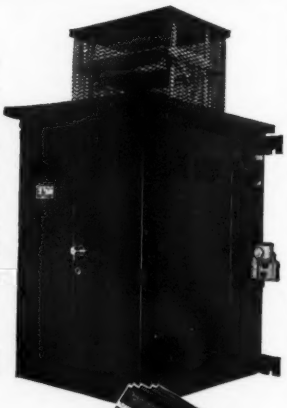
• HOSE—METALLIC TUBING. *Pennsylvania Flexible Metallic Tubing Co.*, Philadelphia, Pa. Bulletins 90, 59-G and 52-G describe and illustrate high pressure flexible all-metal tubing, galvanized steel hose and couplings and bronze steam hose and clincher couplings.

The VALUE of SECTIONALIZING with

I-T-E

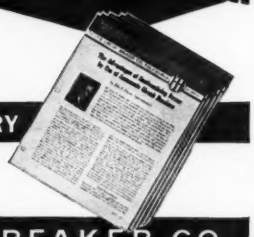
AUTOMATIC RECLOSING CIRCUIT BREAKERS

Raise production; reduce fire hazard; lower maintenance charges; decrease total energy consumption and power demand. These advantages with Automatic Reclosing Circuit Breakers are fully described in I-T-E bulletins based on actual installations in mines.



At right—Each circuit breaker controls a section, confining disturbances to the area in which they arise.

Representatives in Principal Mining Areas



BULLETINS TELL THE STORY

These bulletins deal with a variety of mining conditions. Copies will be gladly furnished on request.

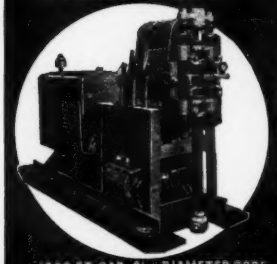
I-T-E CIRCUIT BREAKER CO.
PHILADELPHIA, PA.

ROBINSON
VENTILATING COMPANY

Fans and Blowers
Ventilating Engineering Service

ZELIENOPLE
PENNSYLVANIA

DIAMOND CORE DRILLING
CONTRACTORS



TESTING COAL AND ALL MINERAL PROPERTIES - USING OUR LIGHT GASOLINE DRILLS.. THEY SAVE FUEL AND MOVING COSTS..WE GUARANTEE SATISFACTORY AND PROPER CORES..

PRE-PRESSURE GROUTING FOR MINE SHAFTS... GROUND SOLIDIFICATION FOR WET MINE AREAS BY OUR STOP GROUT METHOD. WATER WELLS AND DISCHARGE HOLES DRILLED AND GROUTED... ELECTRIC DRILLS FOR INSIDE MINE DRILLING..

1200 FT. CAP. 2¼ DIAMETER CORE.

MOTT CORE DRILLING CO.
HUNTINGTON, W. VA.

INDEX TO ADVERTISERS

American Chain & Cable Co., Inc. ..... Third Cover
American Cable Division

Electric Storage Battery Co., The 4

General Electric Co. 5

Hoffman Bros. Drilling Co. 66

I-T-E Circuit Breaker Co. 66

Jeffrey Mfg. Co. 7

Loftus, Peter F. 61

Marion Steam Shovel Co. ..... Second Cover

Mine Safety Appliances Co. ..... Back Cover

Mott Core Drilling Co. 66

Pennsylvania Drilling Co. 66

Roberts & Schaefer Co. 63

Robinson Ventilating Co. 66

Timken Roller Bearing Co. 6

Universal Vibrating Screen Co. 66

Established 1902

HOFFMAN BROS. DRILLING CO.

CONTRACTORS

DIAMOND CORE DRILLING

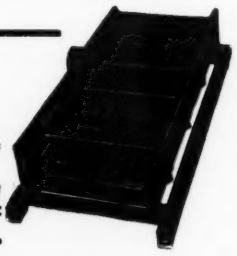
PUNXSUTAWNEY, PA.

Our specialty—Testing bituminous coal lands
Satisfactory cores guaranteed

UNIVERSAL VIBRATING SCREENS

Have that powerful elliptical screening action that keeps screen mesh free from blinding, producing sharp separations and largest capacity.

Write for data on latest improved Screen Models
No obligations whatever



UNIVERSAL VIBRATING SCREEN CO.
RACINE ~ ~ WISCONSIN

We Look Into the Earth

By using Diamond Core Drills. We prospect Coal and Mineral Lands in any part of North or South America.

Pennsylvania Drilling Co.
Pittsburgh, Pa.
Drilling Contractors

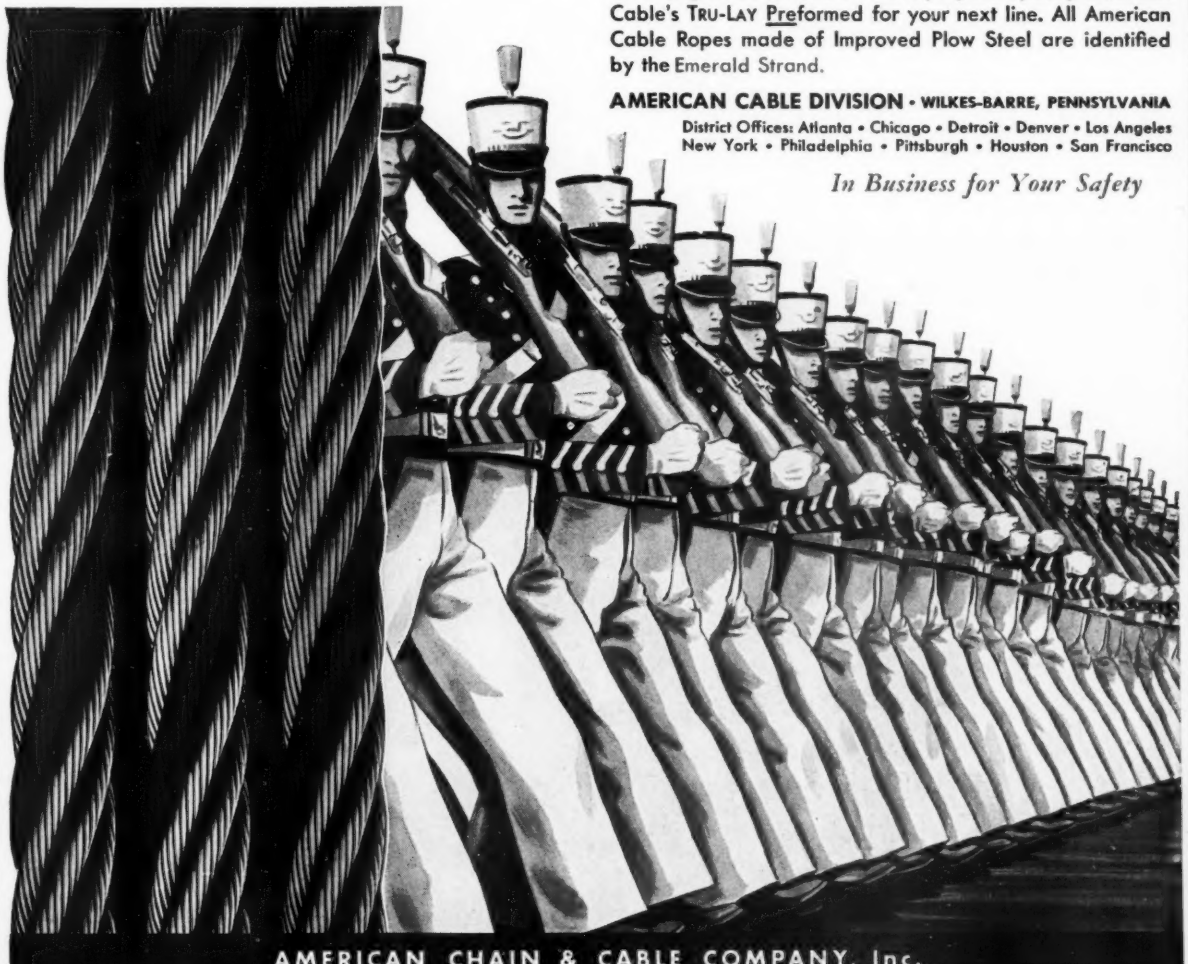
AMERICAN CABLE

TRU-LAY *Preformed* Wire Ropes ARE UNIFORM

UNIFORM IN QUALITY This is a universally acknowledged characteristic of American Cable's Wire Ropes.

UNIFORM IN SERVICE Being uniform in quality, American Cable's Ropes are naturally uniform in service. When American Cable introduced TRU-LAY Preformed, in 1924, we gave all industry a rope that far outlasted ordinary non-preformed, our own make included. Here, too, in increased service, there is uniformity for when one TRU-LAY Preformed Rope does a job unusually well, the second or twenty-second TRU-LAY Rope will do equally well.

UNIFORM IN SAFETY TRU-LAY Preformed is a safer rope. Its crown wires lie flat and in place so that there is less danger of their wickering out and jabbing workmen's hands, which often causes blood-poisoning. TRU-LAY handles easier and faster, resists kinking and whipping, spools on drums better and rotates less in sheave grooves. TRU-LAY requires no seizing when cut and will not fly apart. Specify American Cable's TRU-LAY Preformed for your next line. All American Cable Ropes made of Improved Plow Steel are identified by the Emerald Strand.



AMERICAN CABLE DIVISION • WILKES-BARRE, PENNSYLVANIA

District Offices: Atlanta • Chicago • Detroit • Denver • Los Angeles
New York • Philadelphia • Pittsburgh • Houston • San Francisco

In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.

ESSENTIAL PRODUCTS . . . AMERICAN CABLE Wire Rope, TRU-STOP Emergency Brakes, TRU-LAY Control Cables, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Iron Castings, CAMPBELL Cutting Machines, FORD Hoists and Trolleys, HAZARD Wire Rope, Yacht Rigging, Aircraft Control Cables, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . *In Business for Your Safety*

Consider these 2 FACTS

(VALID ANYWHERE!)

1 ACCIDENTS INCREASE and EFFICIENCY DECREASES ... with reduced illumination

2 ACCIDENTS DECREASE and EFFICIENCY INCREASES ... with more illumination

then ponder this fact:

EDISON ELECTRIC CAP LAMPS

PROVIDE THE FINEST AVAILABLE ILLUMINATION FOR TODAY'S MINERS *EVERYWHERE*

TO sum up, Gentlemen . . . when your men enjoy the Edison Lamp's BETTER LIGHT, BETTER DIRECTED TO THE JOB, *you* enjoy the *savings* that fewer accidents and greater man-efficiency create—the *satisfaction* natural to lowered injury rates in your operations —the *profits* made by higher production per man, per dollar.

The details are waiting, together with an on-the-job demonstration of the Edison Lamp and its ideal partner, M.S.A. Skullgard. Let us bring them to you!

MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STS., PITTSBURGH, PA.

District Representatives in Principal Cities

V
1
A
4
X